Vol. XXIII JULY 1929 No. 7

The EXCAVATING ENGINEER

IN THIS ISSUE:

In the Land of the Midnight Sun.

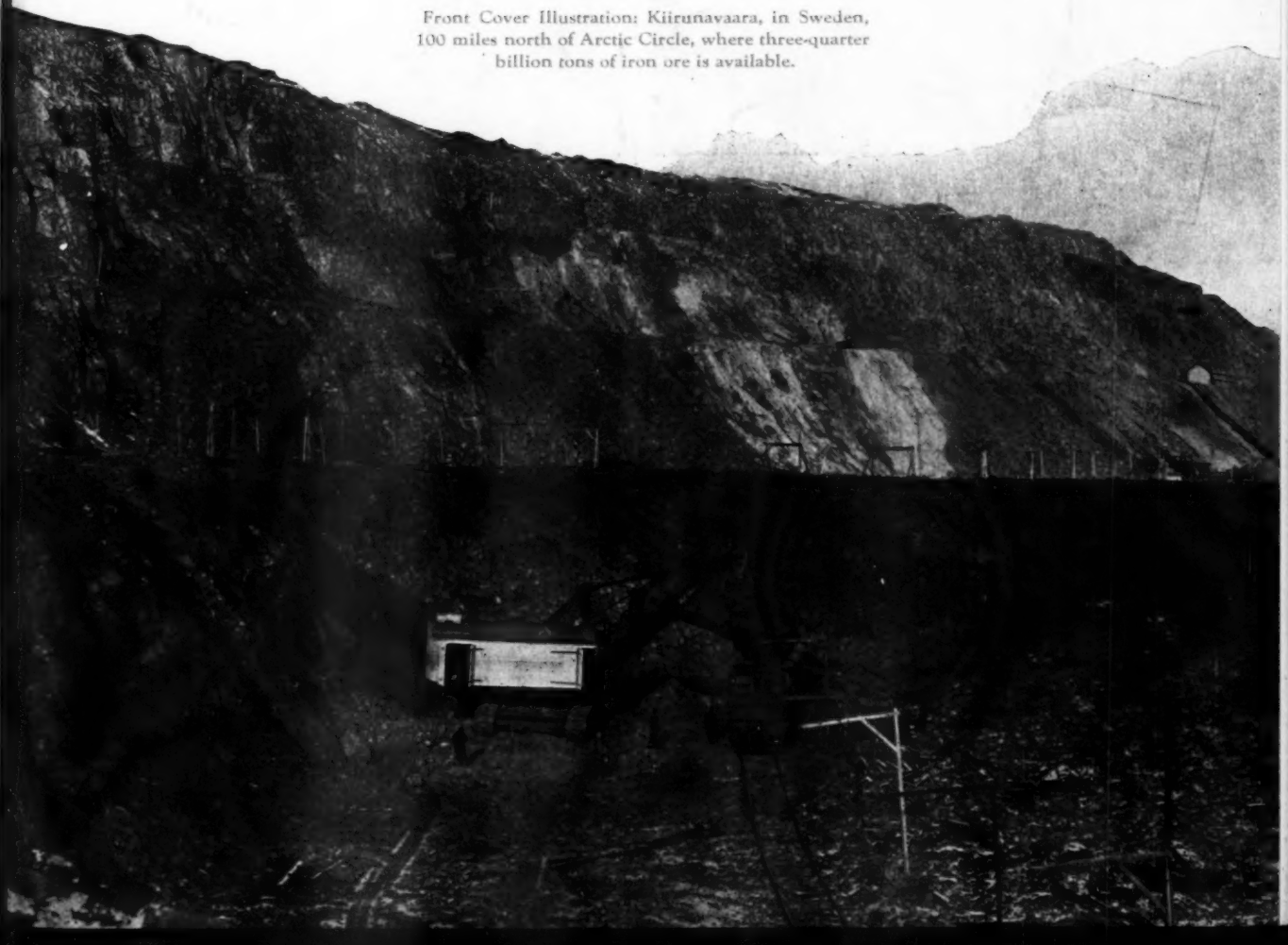
Grade Revision and Separation on the Kansas City Southern at Shreveport.

Power Characteristics of Diesel Engines as Compared with Gasoline Engines.

Putting the Muck Through the Wringer.

Peculiar Material Encountered by Roger Miller & Sons, Ltd., in Stripping King Mine.

Front Cover Illustration: Kiirunavaara, in Sweden, 100 miles north of Arctic Circle, where three-quarter billion tons of iron ore is available.



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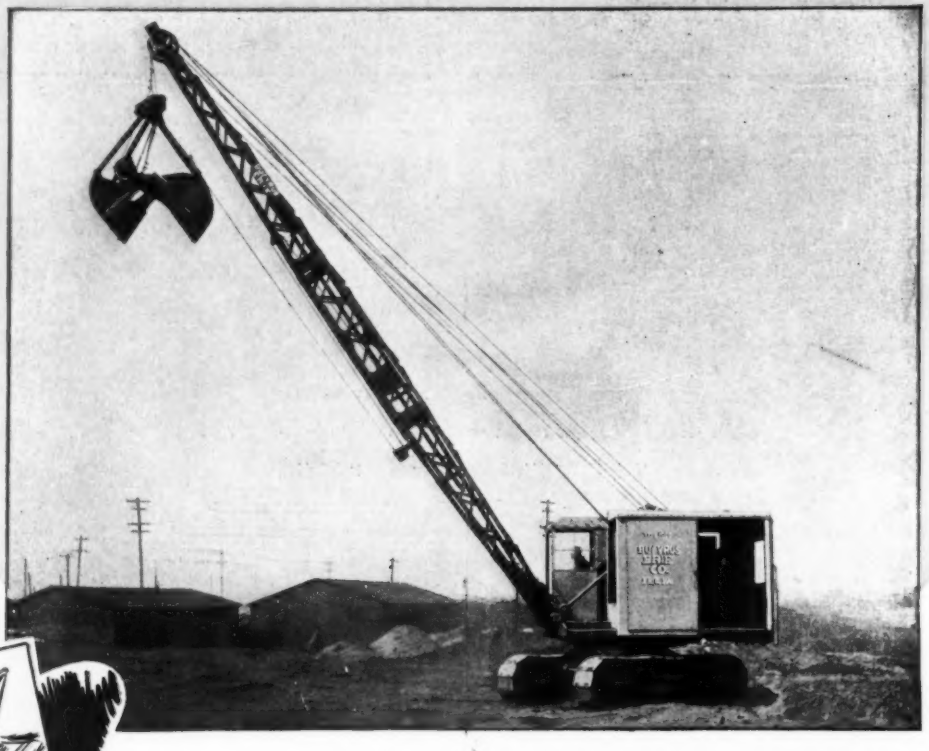

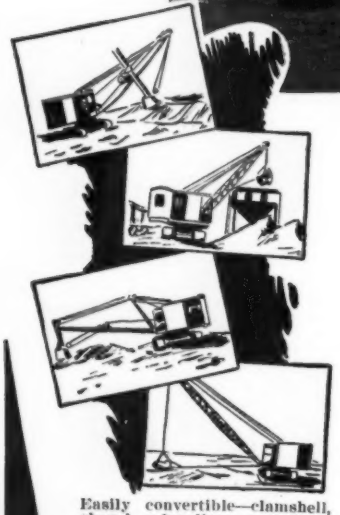

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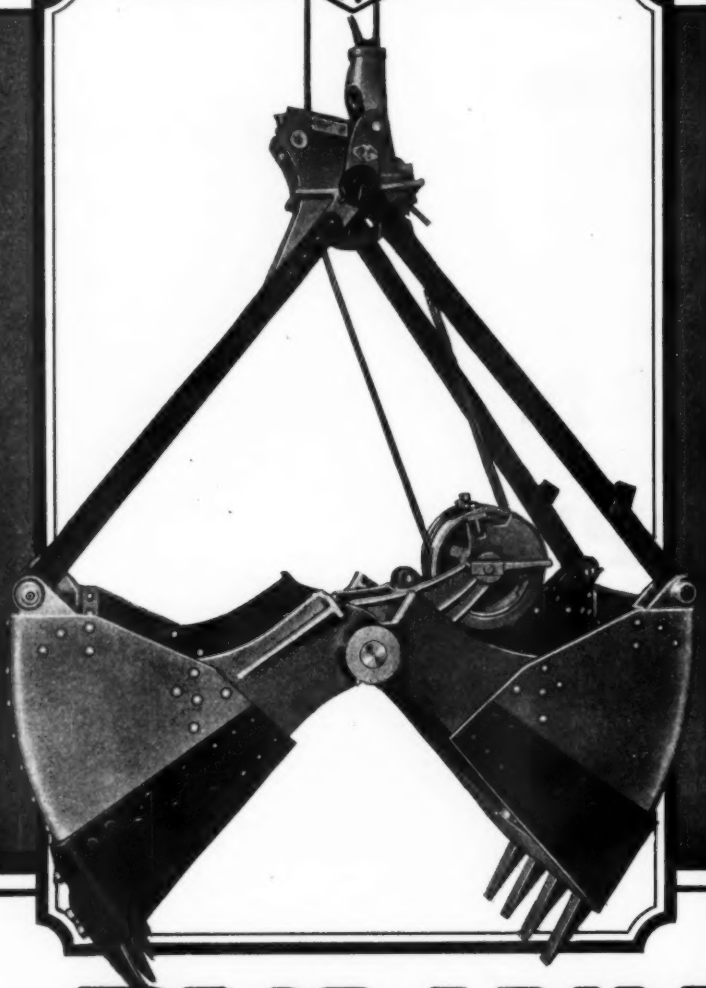

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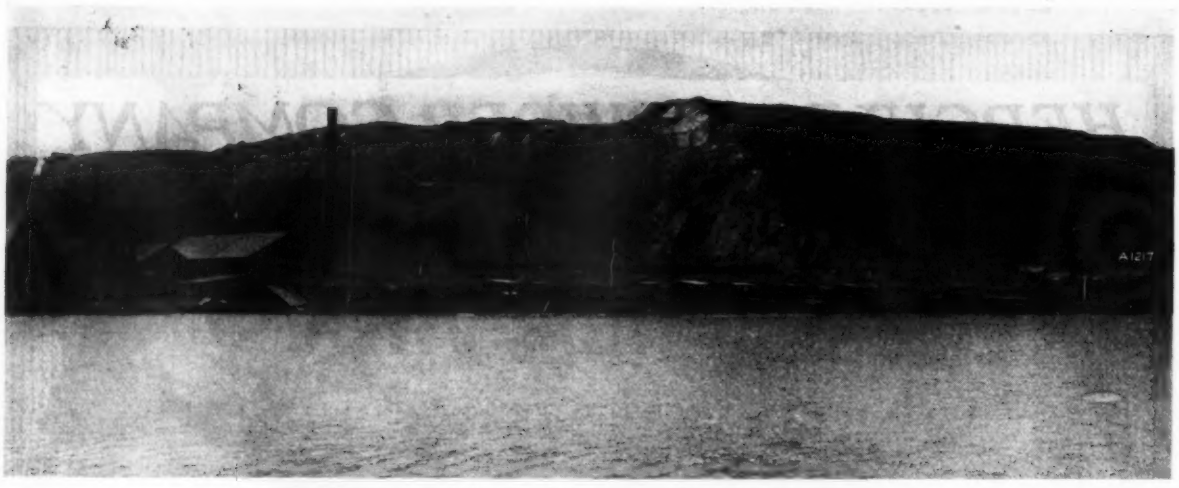
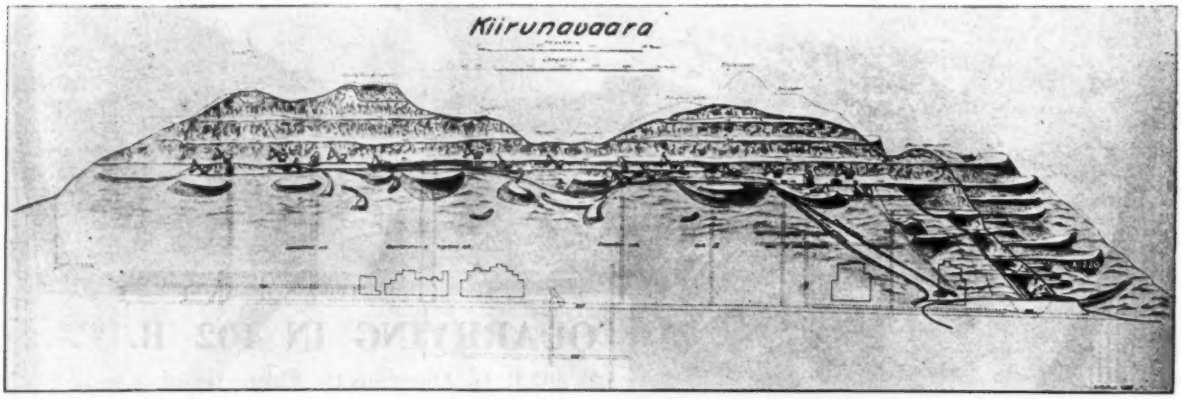


Kiirunavaara and power house as seen from Lake Luossa.



The above sketch gives a good idea of the method of mining and loading ore. The horizontal dotted line at the base of the mountain represents the main railway tunnel and the vertical lines represent the shafts through which the ore falls from the crushers into bins and thence into railway cars. The ore is also being mined by underground methods as shown by the various lines just above and below the main railway tunnel.

View of Kiruna from the mine Kiirunavaara with the small hand-operated mine Luossavaara in the background.

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Midnight sun at Kiruna as seen across Lake Luossa.

In the Land of the Midnight Sun

Great iron ore mines of Kiruna, Sweden produce over 7,000,000 tons per year.

SEVERAL centuries ago about one hundred miles north of the Arctic Circle, the Lapps discovered two mountains of iron. Repeatedly these were explored, but location and natural obstacles in the way of mining prevented development until the early part of this century. Today, however, the T. G. O. mines of the Kiruna district send out this high-grade ore to the steel manufacturers of Sweden, Germany, England, France and the United States at the rate of over 7,000,000 tons a year. Drill holes show that there is still available at least 740,000,000 tons!

There are two mines in operation named after their respective mountains — Kiirunavaara and Luossavaara, the former being by far the largest.

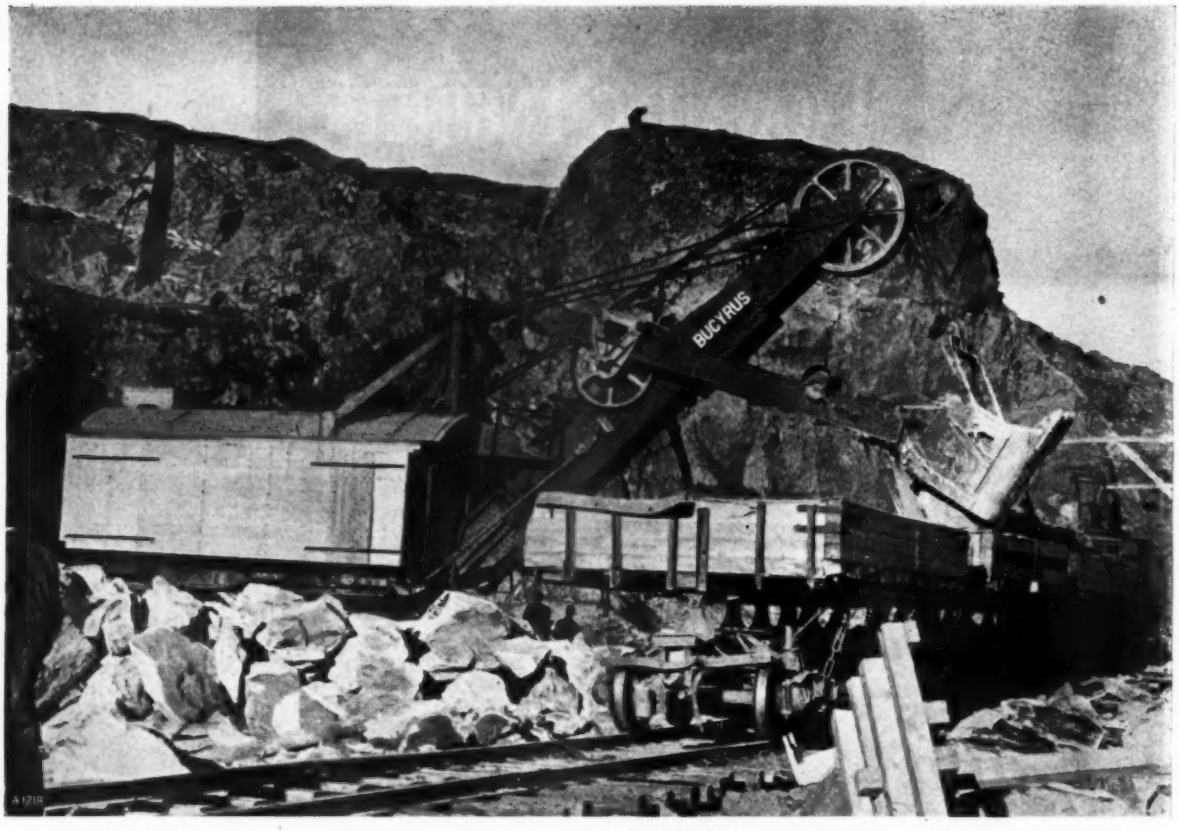
The iron ore of Kiirunavaara forms a mountain range about twenty and one-half miles long, running approximately north and south. The total length of the ore bed itself is about thirty-one miles and the width from 131 feet to 643 feet. The depth of the ore body has not been ascertained but the ore has been penetrated by the bore hole "Zenobia" at about 2600 feet below the level of Lake Luossajavoi. The side inclination of the deposit is variable, the mean being 54 degrees toward E. S. E.; field dip not yet ascertained.

The ore consists chiefly of magnetite with an iron content of between 58 and 70 per cent and is mined in five grades, grade "A" having only 0.030 per cent of phosphorus while grade "G" has 1.50 per cent phosphorus.

Operations Completely Electrified

To extract the ore considerable quantities of useless rock must be removed which is piled in waste dumps on the hanging and foot walls. Electric shovels are used for loading the rock into fifty-eight 12-yard Western Wheeled Scraper dump cars hauled by electric locomotives. A Nordberg electric powered track shifter is used for

NOTE: We acknowledge the courtesy of G. Bergfeldt, chief mechanical and electrical engineer, and W. Andreson, mechanical engineer of Trafikaktiebolaget Grangesberg Oxelosund, Kiruna, in furnishing photographs and interesting data on the mine to E. R. Hayward for use in preparing this article; also to the New York Evening Sun for photograph and article on Kiruna. — Ed.



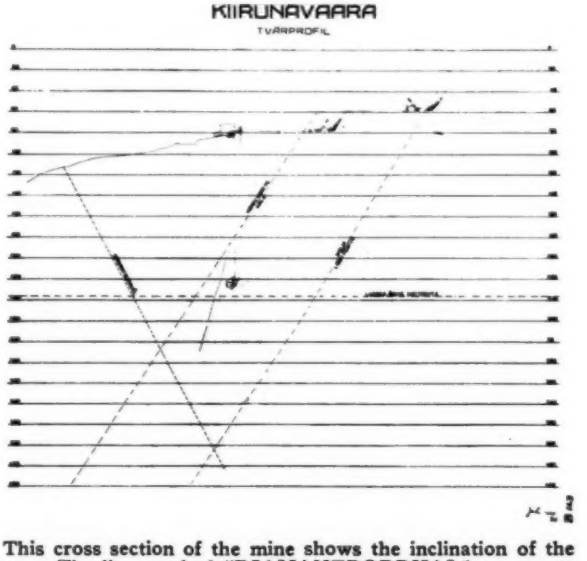
Bucyrus-Erie 120-B loading rock into the Westerns which are hauled by electric locomotives to the rock dump.

raising and lining dumps. So satisfactory has been the performance of this machine that three additional Nordbergs — the new ones for gasoline power to secure more convenient mobility have been installed.

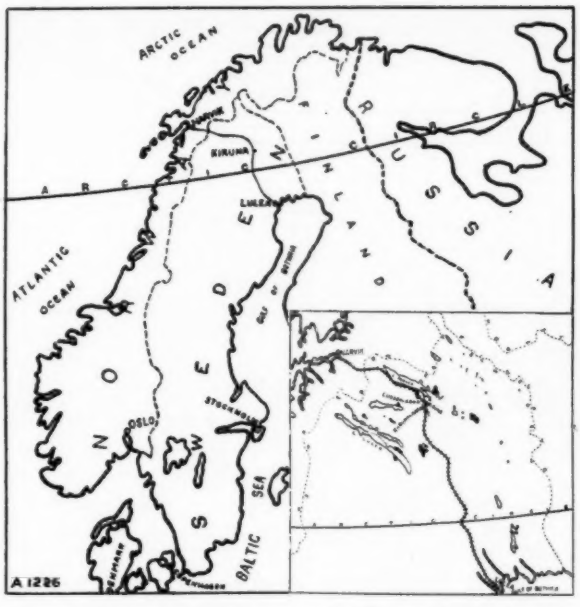
Ore is mined in benches, loaded by electric shovels into 25-ton cars hauled by electric locomotives. The ore is tipped from the cars into ore crushers of the Blake type capable of breaking blocks up to twelve tons in weight. The ore falls from the crushers into vertical shafts whence it is emptied direct by means of hydraulic and electric loading devices into 35-ton railway cars standing in a tunnel. During the loading the cars stand on a weigh-bridge, full load being indicated by light and sound signals. The cars are hauled from the tunnel in 15-car trains by electric locomotives.

Drilling is done with Ingersoll-Rand and Atlas pneumatic drills. The holes are placed horizontally at the base of the bank — so called bottom holes — and vertically from the top edge — so called edge holes. In addition it is often necessary to drill horizontal and vertical intermediate holes in the wall of the bank. Depth varies from 19 to 21 feet. Swedish drill steel is used, 1¼ inch to 1½ inch, round or hexagon, usually with cruciform cut on the drills for the big machines but with hexagon cutting edge for the driver. Atlas drill sharpeners are used and Ingersoll-Rand and Atlas-Diesel air compressors.

Blasting is with 50% dynamite, though trials are being made with 55% and 75% dynamite and



This cross section of the mine shows the inclination of the ore. The line marked "DIAMANTBORRHAL" represents a diamond drill hole.



Map of Sweden showing location of Kiruna about 100 miles north of the Arctic Circle; also ports of Narvik, Norway, and Lulea, Sweden, where ore is transferred from rail to boats. Black dots in insert represent ore bodies.

with 91% blasting gelatine. For the edge holes 55 to 165 pounds of 50% dynamite is used, the average load being about 100 pounds. In the bottom horizontal holes from 110 to 330 pounds are

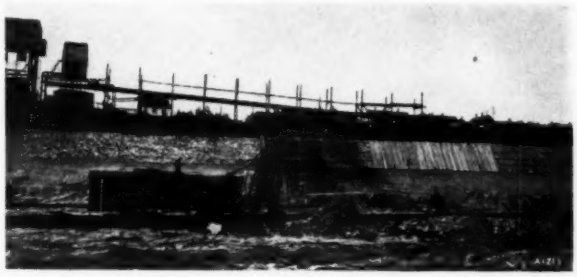
Main office of T. G. O. at Kiruna.

used with an average load of 165 pounds. Ignition for the bank holes is by fuse or cordeau and in shaft and drift holes by electric exploders. The bank holes are shot in the following order: bottom horizontal holes, bank holes, edge holes.

Over Five Tons of Ore Obtained for Each Pound of Dynamite Used

Blasting methods in shovel loading operations give an average of 5.18 tons of ore per pound of dynamite, and 3.93 tons of rock. 30.27 tons of ore are secured for each foot of drilled hole while in rock the average is 28.28 tons.

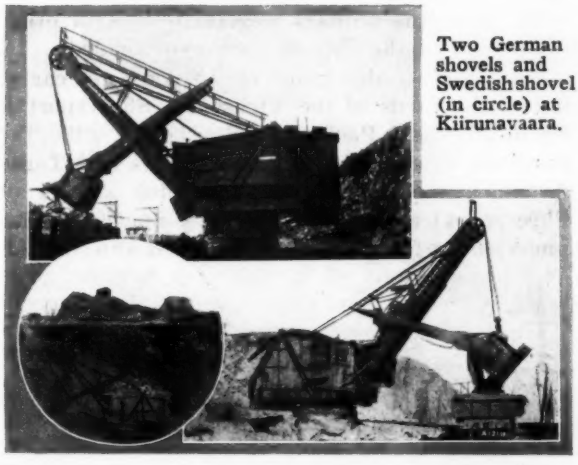
The ore from the Kiruna mines is transported in thirty-five-ton capacity steel hopper cars, hauled in forty-car trains by 150-ton electric locomotives to docks at Narvik, some hundred miles to the northwest on the Atlantic coast, or to Lulea, nearly two hundred miles away on the Baltic. Narvik is the only port open during the winter months although it is considerably farther north than Lulea — this because it lies in the Gulf Stream.



Bucyrus-Erie railroad-type shovel at Narvik, Norway, where three of these shovels load ore from stock piles for boats.

American Shovels Represented by Twenty-Four Bucyrus-Eries

Excavating equipment consists of eight Bucyrus-Erie railroad-type shovels, two Bucyrus-Erie 35-B revolving shovels, two Bucyrus-Erie 120-B quarry and mining shovels, two Swedish shovels and 7 German shovels. All of these are electric machines. In addition to the 21 shovels working at Kiruna there are 3 Bucyrus-Erie railroad-type shovels in stock piles in Narvik; while 7 Bucyrus-Erie railroad-type shovels and one German shovel load from stock pile at Lulea. For loading in drifts there are also an Armstrong and a Hoar

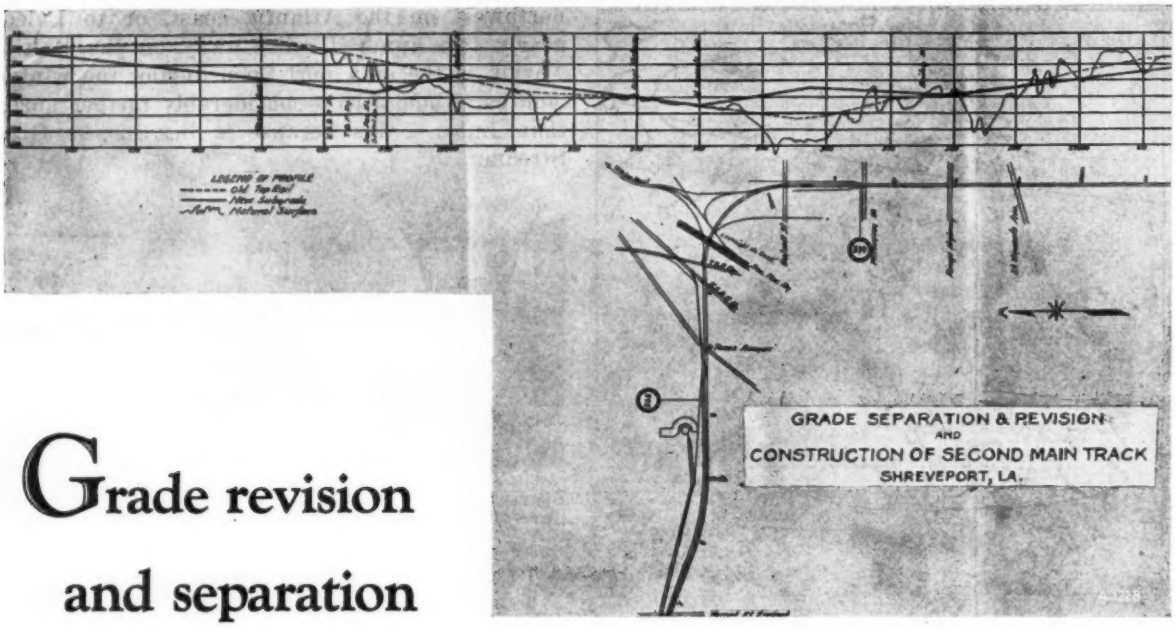


Two German shovels and Swedish shovel (in circle) at Kiirunavaara.

shovel. The operation of the Bucyrus-Erie heavy-duty 4-yard quarry and mining shovels has proven so successful that two additional 120-B machines are now being shipped from the factory at South Milwaukee to the mine at Kiruna.

The electric power is obtained from the Porjus water power station, seven miles away, over an aerial transmission line carrying the current at

(Continued on page 322.)



Grade revision and separation on the Kansas City Southern at Shreveport

List Construction Company of Kansas City, Missouri, compare work of old style and modern shovels.

By E. L. CAMPBELL, *Assistant Engineer, Kansas City Southern Railway Co.*

NOW nearing completion, the work of grade separation of the Kansas City Southern Transportation Yards at Shreveport, Louisiana, has been progressing steadily since May, 1926, when preliminary negotiations with other railroads and the City of Shreveport ended.

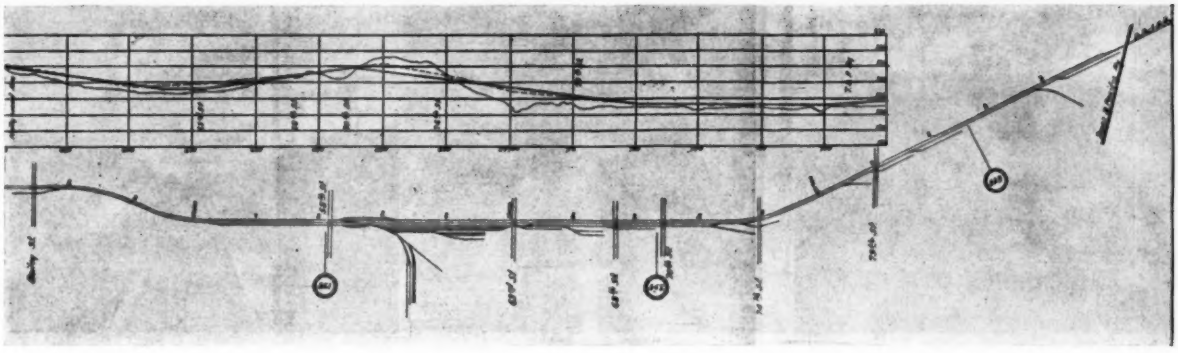
The task included grade revision and the carrying of the yards of the Vicksburg, Shreveport & Pacific, Texas & Pacific and Southern Pacific, the Southern Pacific freight house tracks and Texas Avenue (one of the most traveled streets of Shreveport) over the Kansas City Southern; also underpasses for two streets (Dalzell and Wilkinson). Six miles of second main line were built and 4300 feet of reinforced concrete storm sewer, ranging from 2 feet by 3 feet to 8 feet by 8 feet inside diameter was laid to take care of the drainage in the new cut.

Digging Vicksburg, Shreveport & Pacific Interchange. Texas Avenue Viaduct on left.

The utmost care in planning and skill was necessary to keep all lines of traffic open during construction, for, at a point where the main line changes from under to over grade, a wye, leading to the Union Station and down town district, is located. The north leg of the wye breaks out of the main line just west of the Vicksburg, Shreveport and Pacific bridge and the south leg leaves the main line on top of the Dalzell Street underpass. All three of the foreign lines use this wye to the Union Station and considerable track changes and temporary trestles were necessary in order to keep traffic moving undisturbed.

Waste Dirt Used to Enlarge Southern Pacific Yards

The Texas Avenue viaduct is a reinforced concrete structure of artistic design, having a clear 40-foot roadway with a foot sidewalk on each side. It has three 32-foot spans making room for six tracks, three of which are to be installed at this time. The underpasses at Dalzell and Wilkinson Streets are also of reinforced concrete con-



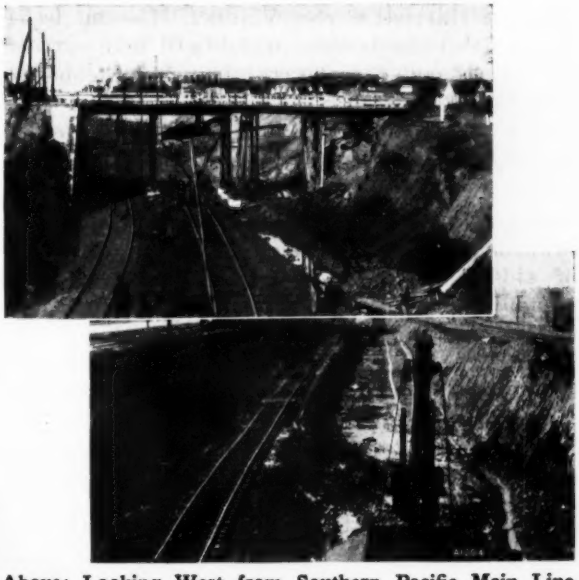
struction and provide for two tracks over 31-foot clear roadway with ample space for sidewalks on each side of streets. The railroad bridges have reinforced concrete abutments and pier footings with steel I-Beam diaphrams on steel posts, and three of these bridges, the Vicksburg, Shreveport & Pacific, the Texas & Pacific, and the Southern Pacific freight house bridge are built to accommodate two tracks overhead and four underneath, while the Southern Pacific yard track bridge will have five tracks overhead and five underneath. The Southern Pacific formally crossed the Kansas City Southern with one-yard lead which seriously handicapped their switching movements and their yards were entirely too small to take care of the present-day increased business. While the Kansas City Southern was engaged in their grade separation the Southern Pacific took advantage of this

50-B cutting out Mechanical Lead.

opportunity to increase their yards; using waste dirt from the Kansas City Southern cut to make the necessary fills, which work is also being carried on at this time.

Total of 350,000 Cubic Yards Excavation and 200,000 Cubic Yards Embankment Required

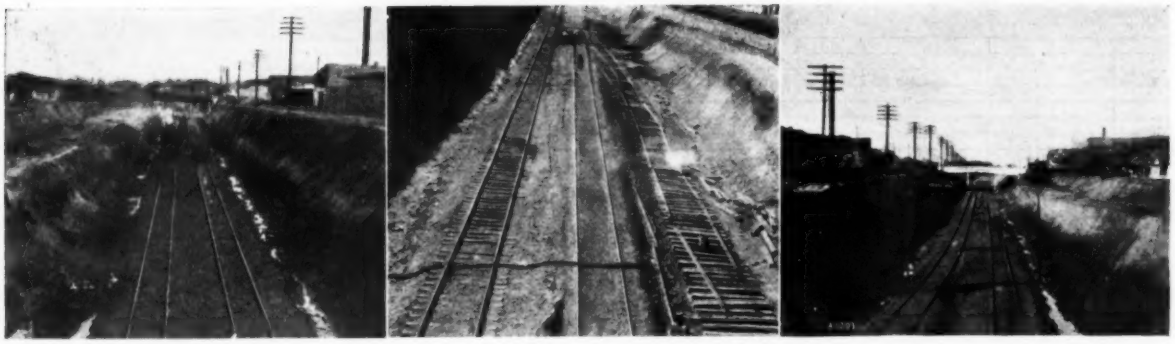
In connection with the grade revision and separation, approximately 350,000 cubic yards of earth excavation and 200,000 cubic yards of earth embankment was necessary in lowering the main lines to the lower level and construction embankment for second main line and making necessary track raises in the old main line to establish a ruling 0.50% grade. Between St. Vincents and Bailey Street a maximum raise of 18 feet was



Above: Looking West from Southern Pacific Main Line Bridge. Below: Shovels working in cut west of Texas Avenue Viaduct.

made in the old main line, this having to be done under heavy traffic. The raise was very satisfactorily made by the forces of the List Construction Company, without any delay to trains of the Kansas City Southern Railway Company.

The contract for excavating between Harriett Street to the Vicksburg, Shreveport & Pacific crossing together with the widening of embankments and raising of grades south of Dalzell Street was awarded to the List Construction Company. The excavation under this contract amounts to approximately 250,000 cubic yards and embankment of about 175,000 cubic yards. The remainder of the excavated material is to be wasted in the vicinity of Mile Post 554 and 555; along Cross Lake which was formed during the construction of the new yards in 1925 for the city water supply.



Left: Looking East from Texas Avenue Viaduct toward Vicksburg, Shreveport & Pacific Bridge. Center: View of cut and new tracks looking west from Texas Avenue Viaduct. Right: Looking west from Vicksburg, Shreveport & Pacific Bridge to Texas Avenue Viaduct.

A maximum cut of 25 feet is at the Vicksburg, Shreveport & Pacific crossing and runs to nothing near the Harriett Street Viaduct. The cut is 54 feet wide at the bottom, which will take care of three tracks at the present time and the banks have slopes of one to one.

The List Construction Company began actual work on October 2nd, 1928, at the Vicksburg, Shreveport & Pacific bridge, cutting their Bucyrus-Erie 70-C in at this point and working west towards the Harriett Street Viaduct. This shovel of old-fashioned railroad type is operated on standard gauge track sections and to facilitate the work four trips were made with this shovel through the big cut. On the first two trips, the cut was made to its final width and excavated to a depth of about 10 feet. This was followed by the last two trips cutting another 10 feet in depth. This left about five feet yet to be cut between the Vicksburg, Shreveport & Pacific bridge and the Texas Avenue Viaduct. The Texas Avenue viaduct had been completed by the railway company forces prior to the time that List Construction Company had begun the grading and to do the excavating under this viaduct, where there was only about two foot clearance above the natural surface, the List Construction Company used a new Bucyrus-Erie 50-B shovel on caterpillar mounting and converted with dragline attachments. While the 70-C was engaged in making the cut between the Vicksburg, Shreveport & Pacific and Texas Avenue, the 50-B was busy in making inclines for the opening under Texas Avenue Viaduct. After these inclines were cut the shovel boom sticks, etc., were installed on the 50-B and it was moved in behind the 70-C to make the last 5-foot cut, which the big shovel was unable to get. After both shovels had reached Texas Avenue the 70-C proceeded on west while the 50-B was taken to the extreme west end and begun working east to meet the 70-C. The work for a period was divided into two shifts, the 70-C working the day shift and the 50-B the night shift. The excavated material was hauled by the List Construction Company's own engines in 12-yard Western dump cars, each train averaged from 12 to 14 cars each trip.

The Kansas City shops at Shreveport are located on the east side of the main line and about midway between Harriett Street and the Texas Avenue Crossing. The cut opposite the round house is about 18 feet deep and as it was necessary to find some adequate route for their locomotives

Filling up the Westerns with the modern 50-B.

to and from the Union Station, an incline track breaking out of the main line just west of Texas Avenue and coming to grade near the inspection pit in the shop yards, was laid out as best suited for the purpose. This mechanical lead cuts into the inbound engine lead that connects the new transportation yard to the roundhouse. Another incline track leaving the main line near the Texas Avenue Viaduct and coming to grade near the Vicksburg, Shreveport & Pacific bridge is to serve the interchange business with this and the Texas & Pacific railroads.

After the big cut was completed the 70-C was

(Continued on page 301.)

Power characteristics of Diesel engines as compared with gasoline engines

Torque and Horsepower analyzed as applied to excavating equipment

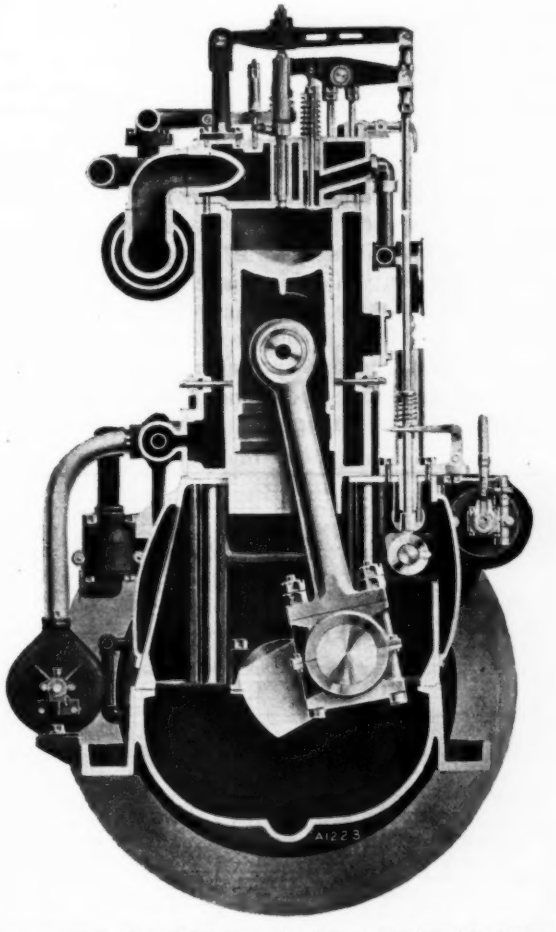
THERE has been considerable confusion caused by a comparison of the horsepower rating of the Diesel engine excavators with those for gasoline engines of comparable sizes. Owing to the differences in the torque or lugging power characteristics of the two engines a horse power rating alone fails to give a correct picture by which to compare the digging power of the two types of machines.

While the horse power ratings for the Diesel engines may be lower than those for the gasoline engines supplied on the same size machines, the characteristics of the engines are different. The Diesel engine, though of lower horse power, will produce a greater rope pull than that produced by the gas engine when the speeds are reduced below normal. The Diesel engine produces more torque than the gas engine and the torque increases more rapidly under load. This is because the time element of combustion in the two machines is different. The combustion in the gas machine is instantaneous thereby giving the maximum pressure on the piston for only an instant. Combustion in a Diesel engine is a slow burning process, whereby the maximum pressure is maintained for a longer period or approximately 25 degrees of the stroke.

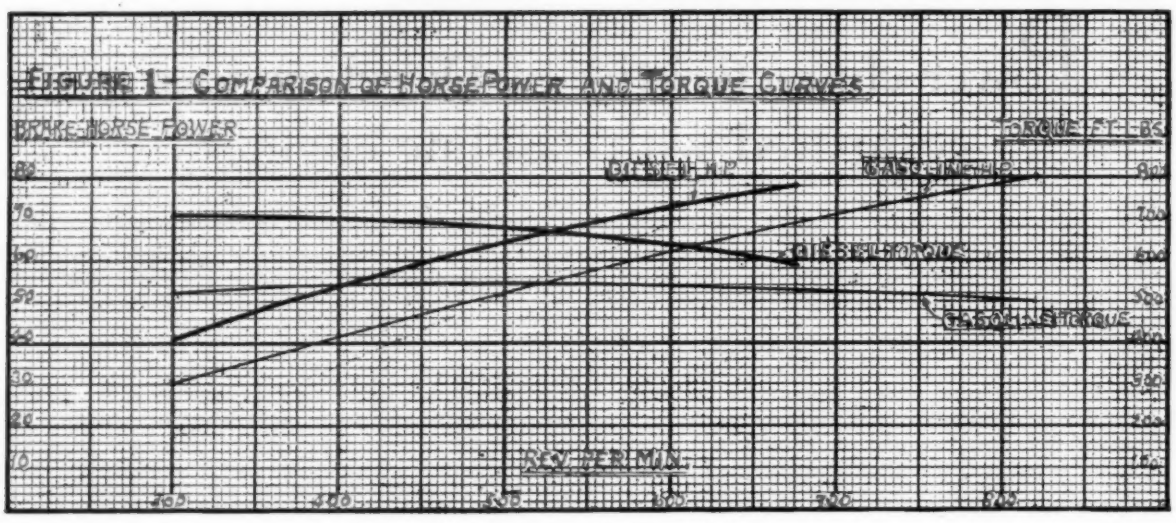
Perhaps we should at this time attempt to explain, for the benefit of those who may not be thoroughly familiar with the Diesel principle, just how this engine works.

Air upon being compressed becomes hot. The degree of heat depends upon the amount of compression. Three hundred and seventy-five to five hundred pounds per square inch of compression creates sufficient heat to ignite fuel oil when properly sprayed into the compression chamber of an engine at the proper time. It is on this principle that the Diesel engine works. If sufficiently atomized the fuel oil will ignite when injected into the cylinder where air has been compressed to secure a temperature above the fire test of the fuel oil. The expansion of the burning fuel oil is the power creating force within the cylinder of the engine. The Diesel engine differs from a gas engine in the fact that it is a constant pressure engine. The injection of the fuel into the engine is timed and controlled to maintain a constant pressure during the introduction while in a gas engine a constant volume of mixture is taken into the cylinder and after compressing same to a safe limit — from about fifty to one hundred and twenty-five pounds per square inch — the mixture is ignited by an electric spark and the pressure instantly rises in the nature of an explosion.

To illustrate the characteristic difference between Diesel engines and gas engines as applied to excavating equipment, the accompanying charts have been prepared showing a comparison between a four cylinder 5¾-inch by 8-inch gasoline engine as compared with a four cylinder 6½-inch by 8½-



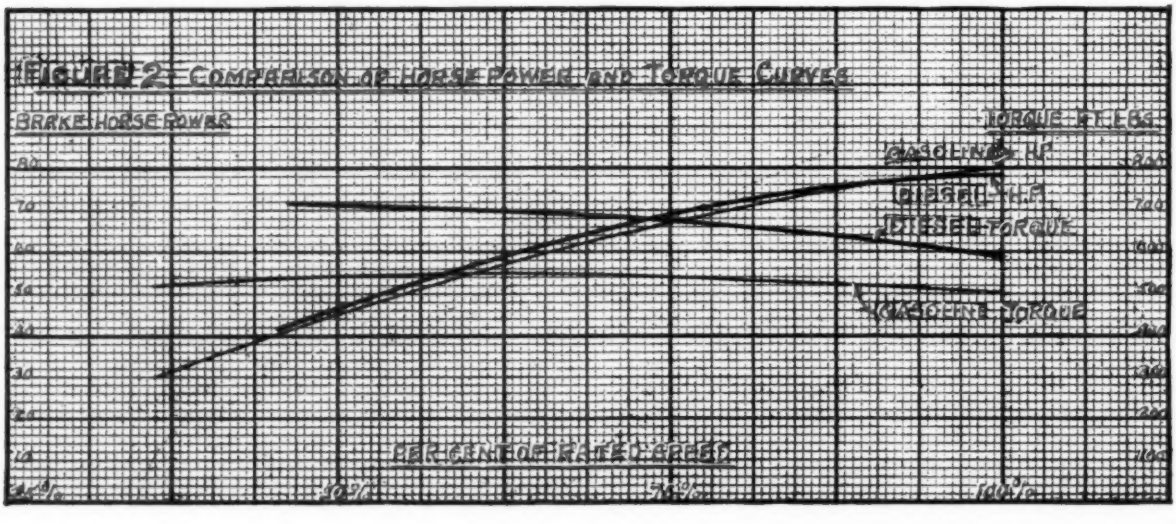
Cross section of an Atlas Imperial Diesel Engine illustrating method of operation.



inch Diesel engine. Figure One shows the engine torque and horsepower curves at various engine speeds which are indicated at the bottom. From these curves it will be seen that the rating of the gasoline engine is 80 horsepower at 820 r.p.m. while the Diesel engine comes up to 78 horsepower with 675 r.p.m. The second set of lines on the chart which indicate torque show that the gasoline engine has a torque of about 500 foot pounds at 820 r.p.m. while the Diesel engine has a torque of about 590 foot pounds at 675 r.p.m.

Figure Two shows the horsepower and torque curves for the same engines on the basis of percentage of speed. That is, the normal speeds at which both engines operate have been considered as 100 per cent and lines have been drawn in on the chart to show what happens as the engine speed is reduced in heavy digging. It will be noticed that the horsepower ratings of the two engines are about the same through the corresponding drops in speed. It will, however, be noted that while in both cases the torque increases while the speeds reduce, the torque of the Diesel engine has a greater rate of increase at slower speed than that of the gas engine.

Curve Three is a comparison of the drum shaft torques as developed at various speeds of the two different engines. As the speed of the Diesel engine is slower than that of the gas engine the gear ratio between the engine and the drum shaft is made so that the speed of the drum shaft is the same for both cases. It will be noticed that at the normal speed of the two engines the drum shaft torques are the same but as the engine speed is reduced by heavy digging effort the torque in the drum shaft increases much more rapidly with the Diesel engine than it does with the gas engine. If a condition in digging was encountered whereby the speed of the gas engine was reduced to 75 per cent of its normal, the torque in the drum shaft would be about 8.7 per cent greater than at the normal engine speed. Under the same condi-

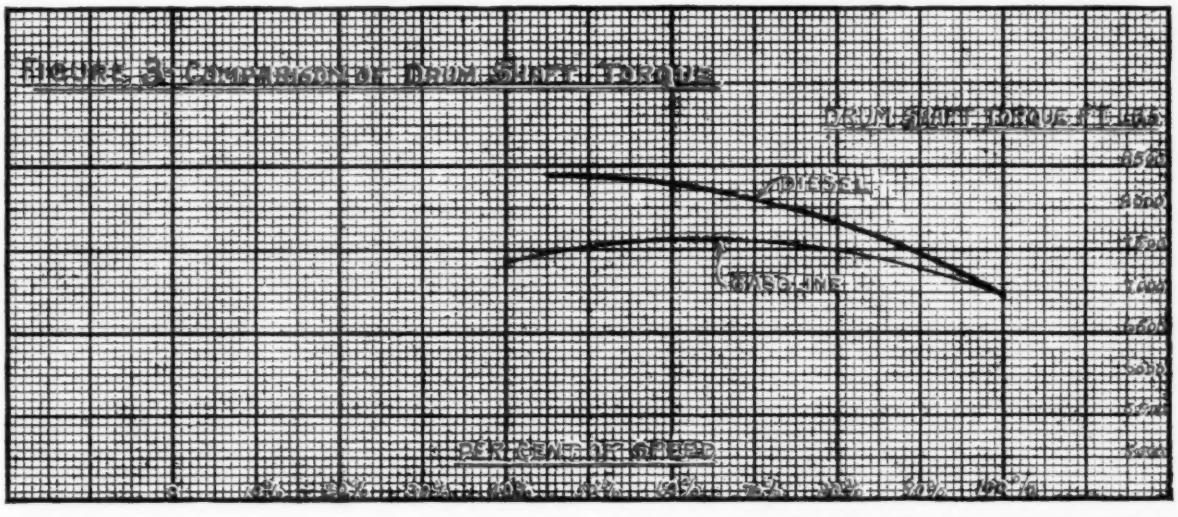


tions with the Diesel engine if the speed were reduced to 75 per cent of its normal the torque in the drum shaft would be about 15 per cent greater than at normal speed.

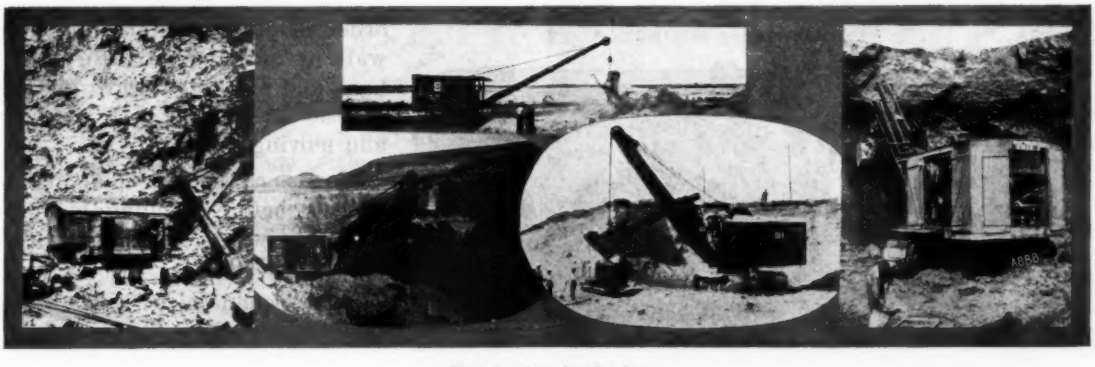
Perhaps we can make this effect clearer to you by using another comparison. Let us assume that the conditions of digging were such that they would require the torque in the hoist shaft of 7500 foot pounds. Under this condition with the gas engine the speed of the drum shaft would be reduced 21 per cent whereas with the Diesel engine the speed would only be reduced 11 per cent. This indicates that under the above digging conditions with a drum shaft torque of 7500 foot pounds required, the Diesel engine would produce the same power at about 12.6 per cent greater hoisting speed as compared to the gas machine.

When a digging condition would require a torque on the drum shaft of 7600 foot pounds (which is the peak of the gas engine) the speed would be reduced 40 per cent whereas with the Diesel engine machine the speed would only be reduced 14 per cent from normal. Under this condition required drum shaft torque 7600 foot pounds — the Diesel engine machine would produce the same power at about 43 per cent greater hoisting speed as compared to the gas machine.

It may also be noted that the gas engine reaches the maximum torque at about 60 per cent of its rated speed and from then the torque decreases. The Diesel engine, however, continues to build up torque as the speed decreases until the engine stalls.



It will be readily appreciated on studying these charts, even though machines equipped with gas engines are offered with a greater horsepower rating, the power produced may not be as great as that available in the same size machine with Diesel engine furnished with a lower horsepower rating. It also helps to explain why the torque or lugging qualities of the Diesel engine are claimed to approach those of the steam engine more closely than gasoline power.



Excavating in Spain.

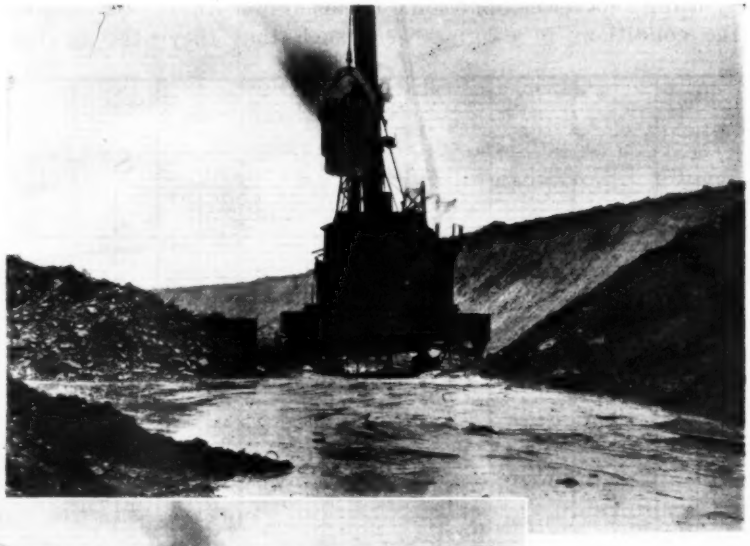
The above pictures show methods of excavating in Spain. At the right is a Bucyrus-Erie 50-B electric in one of Spain's modern quarries. Three center views show how up-to-date Spanish contractors are using Diesels for railroad, reservoir and canal construction. At the right a Gas + Air is cutting a railroad grade through some hard digging.

Putting the muck through the wringer

James McSheery, Perfection Coal Company, handles a tough problem

AFTER taking out his coal last winter at the lowest point in his pit James McSheery, general manager of the Perfection Coal Company, Du Quoin, Illinois, watched his sump hole fill up with water and mud which the constant and heavy rains this winter and spring washed into it from the spoil and high wall.

When he got ready to dig past it on the return out, he had a problem to face, for this sump was now filled to a depth of 8 feet with "soup" — of the thick variety! Being too thick to pump and as Mr. McSheery did not want to dump all this mud up on his high wall where it would again wash in and fill up his well laid out system of drainage ditches, he finally decided to *squeeze* the water out of the mud and then handle the mud with his shovel.



The upper illustration shows the area of this sump hole but doesn't show the depth. It also shows "Jim" in raincoat and southwester standing at right of his shovel, a Bucyrus-Erie 225-B on which a 320-B base has been installed.

In order to "squeeze" this "soup" McSheery reversed the usual order of events and built his buck wall by starting next to the spoil bank and piling it toward the shovel instead of starting near the shovel and moving away.

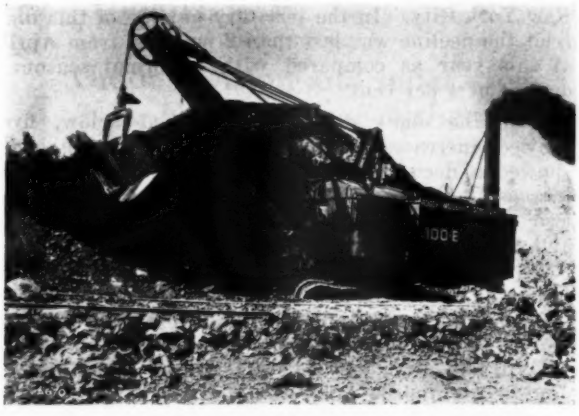
He also carried his shale high into the air before tripping his dipper so that it would go down to the bottom of the sump.

The second picture shows how high he hoisted his dipper before letting go. It also shows the centrifugal pump mounted on a flat car which took care of the water which was squeezed out of the mud.

The lower view shows how he carried the mud out of which most of the water had been squeezed, way around to the three-quarter point before dumping. It also shows the top of the last spoil pile smoothed out for his Diesel dragline to travel on in order to rehandle part of his fifty-foot overburden. The spoil pile put up by this dragline shows in the background though the dragline itself does not show in the picture.

This shovel of Mr. McSheery's has been going right along year in and year out averaging approximately 150,000 cubic yards of overburden per month. As it carries only a 6-yard dipper, this is a pretty good yearly average as it takes into consideration all delays including an annual shut down for inspection and any over-hauling which might have been needed.

Peculiar material encountered by Roger Miller & Sons, Ltd., in stripping King Mine



Stripping rock overburden from asbestos with the Bucyrus-Erie 100-B.

PICTURES accompanying this article show a Bucyrus-Erie 100-B 3-yard steam shovel stripping overburden at the King Mine at the Asbestos Corporation, Limited, Thetford Mines, Quebec. Stripping, which consists of about one million yards, is being handled by Roger Miller & Sons, Limited, prominent engineers and contractors of Toronto. In handling this stripping loose rock is encountered at one end of the pit, and makes up about 10 per cent of the total overburden. The balance is a very dense, water-bearing blue clay. This material, although extremely hard so far as digging is concerned and highly abrasive to the shovel teeth, can also become very soft under certain conditions. The floor of the pit under the vibration of the shovel becomes mush, and except when in the rock it is necessary to keep the shovel on six mats made up by 6-inch by 6-inch by 8-foot hardwood ties crossed solid and bolted. In the softer spots seven mats are used, each made up of four BC fir sticks 12 inches by 12 inches by 30 feet with a 12-inch I-beam at the center and a 12-inch channel on each side. This latter mat gives an area of 30 feet by 32 inches, which is just sufficient to prevent sinking. Even a man can, by shifting his weight alternately from one foot to the other for a period of a few minutes, sink to his knees, and when he pulls his feet out they are dry. This is, of course, in dry weather. In wet weather plastic condition of the clay is much worse.

The Bucyrus-Erie 100-B is loading out an average of 120 twenty-yard Western auto dump cars

Loading the twenty-yard Westerns. Digging is extremely hard.

on the day shift and 100 cars average on a night shift. The day shift has made a record of 150 cars and the night shift 120 cars.

Roger Miller & Sons, Limited, operations at the King Mine are in charge of C. J. Fulton, Manager.

It was at a charity ball and a couple of young fems were holding an indignation meeting over a third one.

"Here we are," remarked one of the girls, "selling kisses to raise money and she's bootlegging 'em free back of a booth."

For Firing Only

"You blockhead!" exclaimed the superintendent, "you've got us into a damage suit. I told you to fire that man — not to hit him with an ax."

"Vell, boss," replied the Swedish foreman, "Does ax she have sign what say 'For Fire Use Only,' so I used her."

The EXCAVATING ENGINEER

A Monthly Publication Devoted to Excavating and Allied Subjects

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The business outlook

As has often been pointed out in business prognostications, the general feeling of business men — the mental attitude of the public — has a great deal to do with future business prospects. Some writers go so far as to say that psychology has a greater bearing than statistics. We do not agree with this view for statistics may show a condition, or a trend toward a condition, which will suddenly and violently affect the psychology of the public.

We find ourselves now, however, at a point where both the mental attitude of the public and the condition of affairs, as indicated by the reports of various statistical agencies, agree in pointing to exceptionally good business prospects. We have just gone through a period fraught with a certain amount of uncertainty — a period when the public had its fingers crossed and a time when statistics were anything but a certain guide to the future. Money rates have remained surprisingly steady during the past month, at very satisfactory levels, and stock prices have shown a downward tendency and are at levels today, which relieve somewhat, the anxiety caused from that quarter during the last few months.

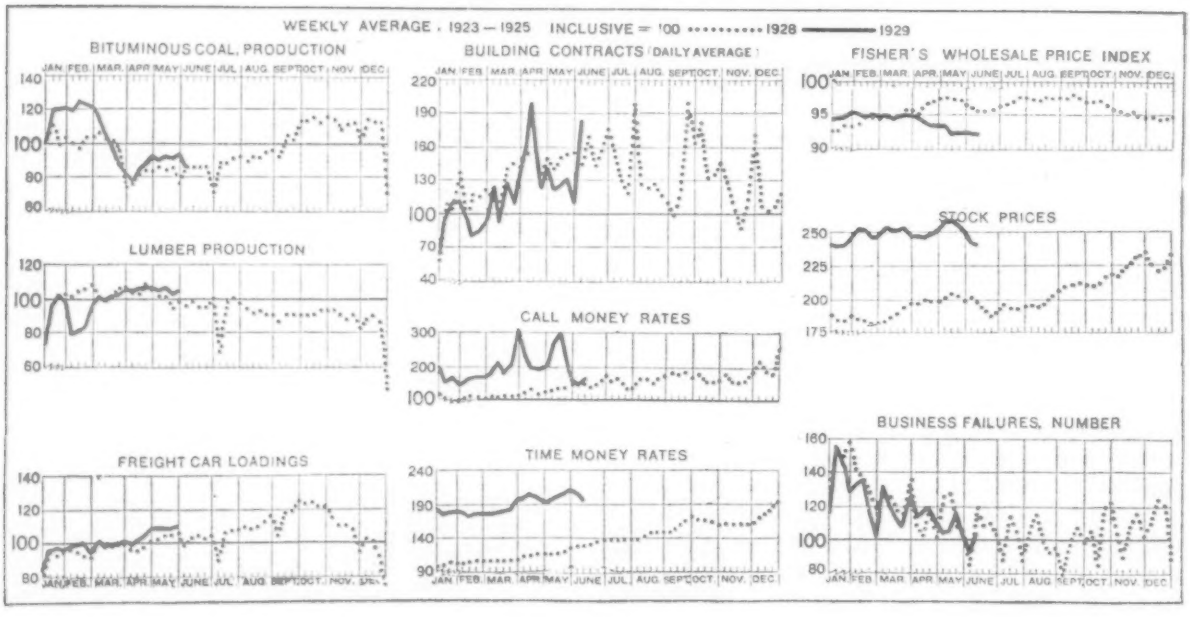
We quote the following from a report by the F. W. Dodge Corporation covering the construction industry for May. It is to be noted first, however, that later information shows a very decided improvement during the first week in June — an improvement in the daily average of building contracts. The first week's daily average being well above the average for a year ago and also above any point during the first six months of 1928. "Contracts awarded in the territory east of the Rocky Mountains during the past month amounted to $587,765,900. This amount represents a decline of 9 per cent from the preceding month and 12 per cent from May, 1928. The most significant decline occurred in the New York State and Northern New Jersey district, indication, apparently, the influence of the recent labor dispute in New York City. In the territory outside of this district the decline was less than 2 per cent from April of this year as compared with a normal seasonal decline of 4 per cent.

"Of the eight districts mentioned below, five showed increases over the preceding month, one showed a decrease from April of this year, but an increase when compared with May, 1928, and only two showed decreases from both April of this year and May of last year.

"In the total contracts awarded in 37 states, the following classes were most important: $192,014,600 or 33 per cent for residential buildings, $139,388,200 or 24 per cent for public works and utilities, $86,470,700 or 15 per cent for industrial buildings, and $38,195,100 or 6 per cent for educational buildings.

"Total contracts awarded for the first five months amounted to $2,485,655,700 as compared with $2,794,410,300 for the corresponding period of last year, a decrease of 11 per cent.

WEEKLY BUSINESS INDICATORS


WEEKLY AVERAGE 1923 — 1925 INCLUSIVE = 100 ····· 1928 ——— 1929
BITUMINOUS COAL, PRODUCTION
BUILDING CONTRACTS DAILY AVERAGE
FISHER'S WHOLESALE PRICE INDEX
LUMBER PRODUCTION
CALL MONEY RATES
STOCK PRICES
FREIGHT CAR LOADINGS
TIME MONEY RATES
BUSINESS FAILURES, NUMBER
JAN. FEB. MAR. APR. MAY JUNE JUL. AUG. SEPT OCT. NOV. DEC.

"New work reported in the contemplated stage in May amounted to $847,156,600, a decrease of 10 per cent from the previous month and of 4 per cent from May of last year."

It is well to note, in connection with the accompanying charts, the uniformity of satisfactory business indications. The bituminous coal production has been almost uniformly well above that of a year ago. Lumber production is very satisfactory at the present time, although it was rather unsatisfactory during the month of February. Steel operations are well above those of last year and Detroit factory employment, an indication of the activity in the automobile industry, is at a very high level. Copper prices are very high and iron and steel prices are at a satisfactory level. It is also to be noticed that Fisher's wholesale price index is lower than it was last year at this time. Debits to individual accounts for 1929 — an indication of individual prosperity — are uniformly higher than in 1928.

Grade revision and separation on Kansas City Southern

(Continued from page 294.)

dismantled and the 50-B was used in cutting out for both these inclines.

The type of soil encountered was of a sandy formation and at some points was very hard, having the appearance of soap stone.

Serious Handicaps Slow Up Work

The work was seriously handicapped by long hauls of excavated material; some of it being hauled the extreme distance covered by the project, which is approximately nine miles, the cut being about the center of the project. Traffic is heavy in the territory, an average of about 100 trains moving through the district in each 24 hours. Rain also slowed up operations to a considerable extent; February carrying the record for rainfall, it having rained 14 days out of a possible 28 days.

2½-Yard Railroad Shovel Averages 1370 Cubic Yards Per Day; 2-Yard Revolving Shovel 1340 Cubic Yards Per Day

In connection with comparative production of the old style and modern machines the List Construction Company give the following figures:

"50-B working 40 days moving 53,574 cubic yards.

"70-C working 110 days moving 178,019 cubic yards.

"Work was started on October 2, 1928, and according to our records the 70-C was dismantled on or about February 12, 1929, making a total of 130 days. We figure the shovel was idle about 20 days during this period, leaving 110 working days for 178,019 cubic yards, or an average of 1370 cubic yards per day.

"50-B started on the inclines on February 21st and finished April 5th; this making a total of 44 days. During this period we figure a loss of 4 days, leaving only 40 days for 53,574 cubic yards, or an average of 1340 cubic yards per day.

"We have not figured in this statement the time spent and yardage moved by the 50-B prior to the time the 70-C was dismantled, as we have no record at hand of the number of days worked or yardage moved by this machine during that period."

In comparing the output of the two machines the large crew of the railroad-type should be kept in mind as compared with the small crew of the modern revolving type. Also that the 70-C is a 2½-yard machine while the 50-B uses a 2-yard dipper.

The List Construction Company is located at Kansas City, Missouri, with general offices at 415 Broadway Exchange Building. W. M. List is president; E. P. Kilty, vice-president, and C. J. Brown is secretary-treasurer. E. P. Kilty was in charge of the operations, having for his superintendent Emiel Taghon, better known as "Belgian Dick." Ed. Fones was in charge of the track forces making the fills and raising track. Leo McDonald and Ed. Randle operated the shovels.

R. H. Tefft was resident engineer in charge of the work for the Kansas City Southern Railway Company.

The Limit

"There's a limit to all things," says Ichabod. "I don't mind washing the dishes. I don't mind feeding the cat. I don't mind mending my own clothes. But I'll be durned if I'll wear pink ribbons on my night shirts to fool the baby."

Minister: "I hear, Paddie, they've gone dry in the village where your brother lives."

Paddie: "Dry, mon! They're parched. I've just had a letter from Mike, an' the postage stamp was stuck on with a pin." — *Schaefer Magazine.*

Little girl: "And what is a stork, mother?"
Mother: "A bird of chance, my dear."

A Hoss Fly lit on the old cow's skin
Hung up his tools and spudded in,
He bent his back and jiggered his pole
And all the time he was making Hole.

The cow grazed on its usual way
Till the Hoss Fly bit dropped into pay
Then she swung her tail with a vicious dig
And deftly skidded the Hoss Fly's Rig.

Florian: "Chief, ah needs protection! Ah done got a unanimous letter this mornin' which done says: 'Nigger, let ma chickens alone'."

Chief of Police: "Why protection? Just leave the chickens alone."

Florian: "Dat's all right, boss, but how does I know whose chickens I'se to leave alone?"

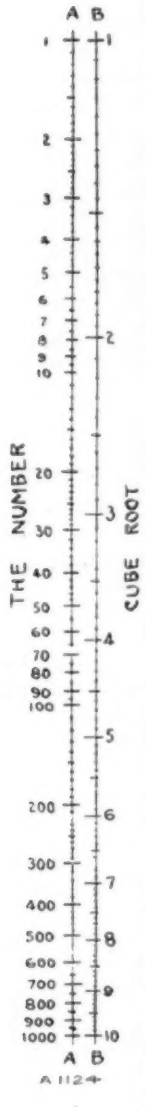
FIELD NOTES

Cubes and Cube Roots

This simple scale will solve any cube root problem without the necessity of hand calculations.

For example, what is the cube root of 100?

Find the 100 in Column A and the answer is instantly found in Column B as 4.64. Much quicker than figuring.



The cube root of 200 is 5.85; the cube root of 1,000 is 10; and so forth indefinitely.

The same scale can also be used for finding the cube root of any number greater than 1,000, but one must watch the number of digits. Cube root always goes in "threes." Thus if you want to find the cube root of 4,000, cut off three digits from the right and four remains. The answer will then be 15.9. The cube root of 4 is 1.59 and therefore for 4,000 the cube root will be 15.9. It is very easy.

To find the cube root of 60,000 or 60,000,000 the result is found opposite the 60. Thus for 60 the cube root is 3.92; for 60,000 it is 39.2 and for 60,000,000 it is 392.

For quantities less than one the method is similar. Thus the cube root of .001 is 0.1. The cube root of .02 is 0.271, and so forth. You can't make a mistake.

In other words, when you move the decimal point three places to the right in Column A it must be moved one place to the right in Column B. And when the decimal point is moved three places to the left in Column A it must be moved one place to the left in Column B. It is always in "threes."

Also, the same scale may be used for finding the cube of any number. Thus, what is the cube of three? Find the 3 in Column B. The answer, 27, is found opposite the 3 in Column A. Use the scale enough to become familiar with it and you will dislike hand figuring more than ever. It is not absolutely perfect, of course, but it is close enough for most practical computing purposes. It is a time saver.

W. F. SCHAPHORST, M.E.

How Many More?

A preacher said to his congregation: "There is a certain man among us who is going with another man's wife. Unless he puts $5.00 in the collection box his name will be read from the pulpit." When the box came in there were nineteen $5.00 bills in it and a $2.00 bill with a note pinned saying: "This is all the cash I have, but will send the other three dollars Wed." — *Monticello Times.*

MAIL BAG

Williams Lake, British Columbia.

Dear Sirs: Will you please insert a card of thanks to the Companies who have supplied me with valuable data as to their products. I find it impossible to answer them all separately.

The request to your valuable magazine for literature certainly got quick results.

Thanking you, I remain,

Yours truly,

G. M. GOODRICH.

When filling in postcard bound in the center of each issue of *The Excavating Engineer,* make sure before mailing it that your name and address are written plainly and that information you wish is clearly indicated.

Just the other day we received a card from a friend in Montana (the post mark does not show the city). The information he desired was clearly indicated but through oversight he omitted giving his name and address. Naturally we're sorry we cannot help this reader, but we hope he comes back and gives us a friendly "bawling out" so we can, in the end, secure the information he desires. — *The Editor.*

Safety Movie

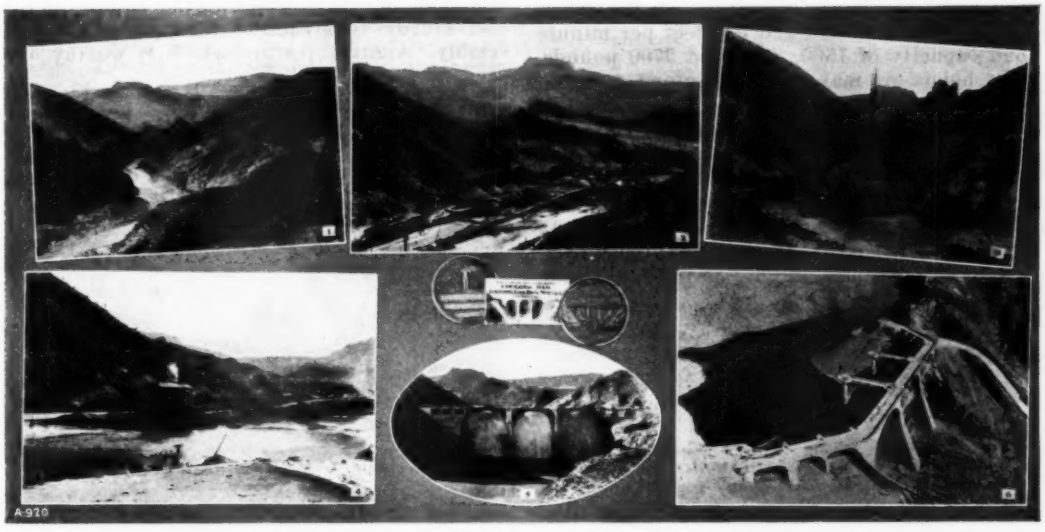
In connection with the campaign to reduce the number of accidents to children from playing with blasting caps, the Institute of Makers of Explosives have prepared a one-reel motion picture film entitled "How Jimmy Won the Game." This film shows forcefully and in a way which can be understood by the children the dangers of a blasting cap as a plaything. It is based on a story of a baseball game in a small town. It is proposed to offer this film to schools and safety meetings. Copies of it can be had by addressing *C. Stewart Comeaux, Secretary, Institute of Makers of Explosives, 103 Park Avenue, New York City.*

In a survey recently conducted by the Institute, it was shown that there are approximately 500 children blinded or injured each year as a result of playing with blasting caps. Most of these accidents occur in rural districts, and are due in every case to the carelessness of adults, who leave these objects about where they can be found by the children.

A Scot and his wife went into a restaurant and ordered one sandwich and two plates, cutting the sandwich in half as it was served. He was chewing away ravenously, while his wife looked on, which led the waiter to ask: "Is there something wrong with the sandwich, madam?"

"Na," she no'ed, "but Sandy is using the teeth."

Atkinson, Kier Brothers, Spicer Company award service medals to Coolidge Dam workers



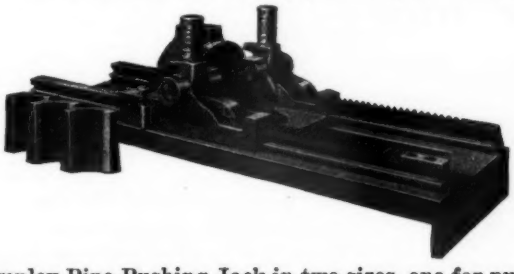
On the recent completion of the Coolidge Dam at San Carlos, Arizona, construction of which was described in our issue of August, 1928, Atkinson, Kier Brothers, Spicer Company presented to workers and to equipment manufacturers service medals as shown in the above illustration, showing a pictural story of the dam construction.

The Coolidge Dam project, built by the United States Government, is principally for irrigation purposes, and half of the water goes to the Pima Indians. It is located on the Gila River at the head of the canyon on the Pima Indian's reservation and will serve to irrigate their land. The construction involved was 300,000 cubic yards of rock excavation for spillway and foundations and 201,000 cubic yards of concrete. The cost was somewhere in the neighborhood of $4,500,000. Considerable interest has been attracted by the dam because it is the first of the new type designed by Major C. R. Olberg, and called the multiple-dome type.

EQUIPMENT YOU OUGHT TO KNOW ABOUT

New Simplex Jack for Pushing Pipe

For pushing pipe under ground the manufacturers of Simplex Jacks, *Templeton, Kenly & Co., Ltd., 1020 South Central Avenue, Chicago, Illinois,* now offer the



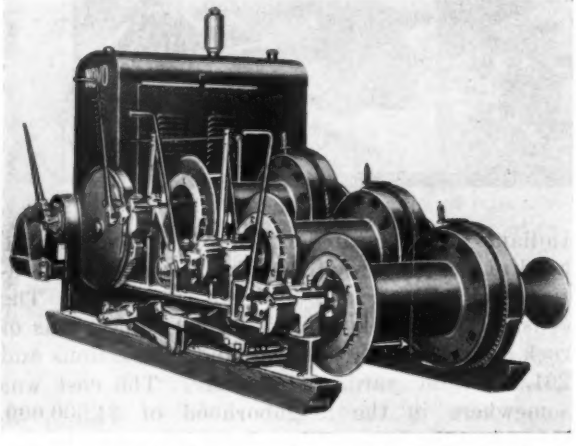
Simplex Pipe Pushing Jack in two sizes, one for pushing pipes of ¾ inch to 2 inches and the other for pushing pipes of 2 inches to 4 inches in diameter. The pipe is gripped by jaws in the center of the jack illustrated, and one or two men operating each of the two levers cause the pipe to be pushed through the ground powerfully and accurately. It is claimed that with this device, water, gas pipe, or pipe for electrical service or for oil-heating supply, can be driven under paved streets or alleys, or under gardens or lawns, irrespective of temperature conditions. The average time required to push a three-inch pipe through 25 inches of solid soil is between 5 and 6 minutes, this having been arrived at from a job where a 3-inch pipe was pushed a length of 110 feet. The drive of the jack is 25 inches, and it is then necessary to reset the jaws on the pipe for another pull.

Bulletins describing these jacks may be obtained from the manufacturers, *Templeton, Kenly & Co., Ltd., 1020 South Central Avenue, Chicago, Illinois,* or from branch offices of the *Graybar Electric Co., Inc.*

A New Novo Three-and-a-Half Ton Hoist

A new hoist, the WH, has just been designed by the *Novo Engine Company, Lansing, Michigan,* for handling loads up to three-and-a-half tons. The standard line speed is 250 feet per minute, the greater loads, of course, being handled at lower speeds. A special, high-speed, one-drum hoist is included in the series that has a line speed of 480 and 520 feet per minute and a load capacity of 1500, 2300 and 2700 pounds. The regular hoists are manufactured in one, two and three-drum units.

It is claimed by the manufacturers that an exceptional strength and rigidity has been achieved by constructing the frames, gears, ratchets and pawls of Novite. Novite is the new alloy perfected by the Novo Engine Company that has a transverse strength of 80 per cent to 100 per cent more than cast iron. It wears four to six times as long as the best grade of semi-steel.



Danger of the base warping and the gears and bearings consequently twisting from line is eliminated by using the Novo all-welded steel base. Electric welding of each joint unites the base parts into a rigid one-piece unit. To further insure absolute rigidity, spreaders are tubular rather than the usual square castings or channels. By actual test at the Michigan State College, East Lansing, Michigan, it was found that a 2½-inch pipe resisted ten times more tortional force than a 4-inch steel channel — although the channel weighed slightly more per foot than the pipe.

Write the *Novo Engine Company at Lansing, Michigan,* for full information mentioning *The Excavating Engineer.*

A New Little Backfiller

Among the recent interesting developments in construction equipment is the Model F Backfiller, built by *The Buckeye Traction Ditcher Co., Findlay, Ohio.* Being a miniature of its bigger brothers, Buckeye Backfillers Models D and O, it incorporates proportionately their dependable and profitable working abilities. An analysis of its capabilities would indicate that it will be enthusiastically received.

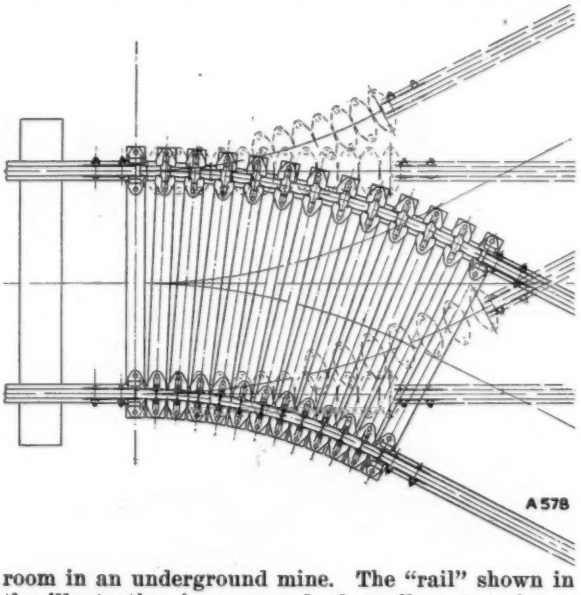
This small, compact and economical Backfiller has a surprising capacity, and is capable of easy operation. It is interesting to note that it is powered with a 4-cylinder, medium-speed, heavy-duty motor of standard manufacture and Twin disc clutch. The boom has a swinging range of 160 degrees. Brakes of sizable dimensions, attached directly to its twin full length Alligator (crawler) traction wheels, provide for safe operation on steep grades, and as each wheel is independently driven, the unit can turn completely around in its own length. The operating levers have been conveniently arranged for efficient one-man control, and Model F possesses an extremely practical and sturdy construction throughout its entire assembly. Another feature which is worthy of special

mention is that its telescopically adjusted boom is controlled by hand wheels through worm-and-gear mechanisms from the operator's platform, for both elevation and working angles.

For further information write the manufacturers mentioning *The Excavating Engineer.*

A Flexible Rail

The Clarkson Flexible Rail, illustrated here, has just been put on the market by the *Illinois Power Shovel Company.* This rail was originally designed to enable a track-mounted shovel to clean up a wide



room in an underground mine. The "rail" shown in the illustration is composed of small cast-steel sections with stop ears attached, which rest in chairs mounted on cross ties. Upon moving the track the inside sections contract and the outside lets out, forming a uniform curve.

(Continued on page 320.)

SHOTS FROM THE FIRING LINE

Road Show to Be Held in Largest Room in the World

The 1930 Road Show at Atlantic City, New Jersey, January 11th to 18th, 1930, will be held in the Atlantic City Convention hall — largest room in the world, which can seat 40,000 people. Located on the boardwalk, with the Atlantic Ocean for its front yard, the Atlantic City Convention Hall, a city in itself, has, within its walls, theatres, ballroom, auditorium, bath houses and a garage for parking 400 cars. Practically everything needed by mankind except sleeping accommodations is furnished. The building cost $10,000,000, and is operated by the municipal government with the aid of a citizen's commission. It covers an entire city block 350 feet wide by 650 feet deep. 40,000 can be seated comfortably in the main auditorium; 5000 can be accommodated in the ball room; and throughout the entire building the whole permanent population (66,000) of Atlantic City could be seated with room to spare. The roof of the main auditorium is 135 feet above the floor at its highest point, and is supported by ten pairs of three hinge trusses weighing 220 tons per pair. These trusses have a clear span of 350 feet, and are said to be the largest ever erected in a building of a permanent nature. 1,800,000 watts of electric power are used to illuminate this largest room in the world, and would meet the lighting needs of a community of 10,000 people. A special layout and system of light control was designed and built by Westinghouse Electric and Manufacturing Company to take care of and supply the desired lighting effects of the auditorium, ballroom, exterior, etc.

Panama Notes

BY J. I. MORAVEC

Surveys of the proposed route of the Trans-Isthmian Highway, from Portobelo to Colon and from Colon via Monte Lirio to connect with the Madden Road between Gamboa and Alhajuela, have been completed, but, with the exception of the Madden Road, construction work has not been started.

Canada

New Brunswick Notes

BY E. M. HEUSTON

An award of five contracts of highway construction at a total cost of $166,000 was recently announced. Contractors are: **Colter & Flemming,** Fredericton; **John E. Forbes,** Fredericton; **Currier & Seymour,** Fredericton; **Smith & Williamson,** St. John; **Canadian Construction Co.,** Fredericton.

Quebec Notes

Dave Devito of Neuville, Quebec, has been awarded contract for gravelling a section of the Montreal-Levis Highway. Engineer Alex. Fraser is in charge of the road work for the Province of Quebec.

Alberta Notes

H. G. MacDonald, Calgary, has been awarded a contract for 48 miles of gravelling, 30 miles on the Sunshine Trail and 18 miles on Calgary-Medicine Hat Highway.

W. A. Foreman received award for second course of gravelling, 25 miles on Cardston-Waterton Lakes Highway and 19 miles standard earth grading on the Wabamun Road.

H. G. Macdonald was awarded 36 miles of grading on the Lacombe-Nevis Road.

Fred Mannix will grade 12-mile section of Calgary- Medicine Hat Highway.

The Government of Alberta will soon begin the construction of a gravel road 20 miles long from Okotoks to Turner Valley Oil Fields; the cost will be approximately $50,000, of which the Government pays $25,000 and the oil companies $25,000.

W. A. Foreman and Company of Edmonton have recently been awarded a contract for 19 miles of earth grading which involves 150,000 cubic yards of excavation. The operation will commence immediately.

H. G. MacDonald Company of Edmonton is getting ready to start their new contract of 36 miles of highway grading involving 280,000 cubic yards of excavation. This company has also secured contract for some 43 miles of gravelling on the Calgary-Medicine Hat Highway.

Fred Mannix of Calgary has been awarded contract for excavation amounting to 90,000 cubic yards on 12 miles of grading.

Montreal and Vicinity

George A. McNamee, secretary-treasurer of the Canadian Good Roads Association, New Birks Building, Montreal, announces that the next annual convention of the association will be held in September, 1929, at Charlottetown, Prince Edward Island. Further announcement will be made later regarding special cars, or possibly a special train, to be run from Toronto and Montreal to the Island for this convention; also full details regarding rates for motorists. The exact dates for the convention have not yet been definitely decided, but will be fixed at an early meeting of the directors of the association.

Ontario

BY A. LEUTNER

R. B. Herron, Ltd., of Welland, Ontario, has started work on their new contract involving some 600,000 cubic yards of earth excavation.

Kendell Brothers has just completed a 90,000 cubic yard rock excavation for the Dominion Square Building, Montreal, and are well along on their jobs of excavating the head office building for the Canada Bank of Commerce at Toronto. They are using the two Bucyrus-Erie B-2 steam shovels as shown above to excavate 72,000 cubic yards of hard pan, rock and clay and their average production is 340 loads of 3½ yards each per ten hours. The machines took out large granite foundation laid in cement mortar including the vaults which were left in the old bank building. The new Bank of Commerce Building, when completed, will be the largest of its kind in the British Empire. It is going to be 32 stories above the ground and excavated to a depth of 66 feet below the street level — the deepest excavation ever done in Ontario. Kendell Brothers have standardized Bucyrus-Erie Type "B" machines and have five of these in service at the present time.

The sting of a hornet is a little thing, but it has been known to lift 200 pounds of meat two feet in one second. That's concentration!

SHOTS FROM THE FIRING LINE — Continued

New York Notes

E. C. Soper, formerly of the Pennsylvania Dixie Cement Corporation, has resumed the practice of his profession as consulting engineer with offices at 17 East 45th Street, New York City.

New England Notes

BY J. C. ALEXANDER

Carlo Bianchi & Company of Framingham, Massachusetts, have been successful bidders on considerable highway work this year. They were low bidders on the Pembroke, New Hampshire job and also the Stratham work on which bids were opened June 13th.

Henry Ford's work at Wayside Inn has commenced for the season. Charlie Turgiss who operated for them last year has gone back to the levers.

J. W. MacDonald and L. C. Wheeler paid us a recent visit.

The R. E. Cunniff Co. and the University Excavating Co. are working on the new development at Spring Street, West Roxbury. The R. E. Cunniff Co. have a Bucyrus-Erie Gas + Air and B-2 steam on the work and the University Excavating Co. are using one of their Bucyrus-Erie B-2 steamers.

The fifth section of the Dorchester Rapid Transit has been awarded to the **Peerless Construction Co. of Boston.**

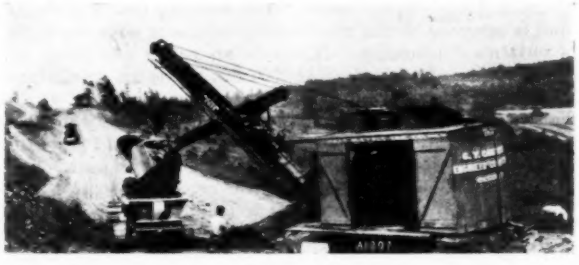
Frank Lanza & Sons have started excavating work on a large job in Newton on which they are using their Bucyrus-Erie 41-B steam shovel.

Well, if it isn't our old friend **Jack McDermott.** Mac's just completed work for A. G. Tomasello & Sons at Commonwealth Pier where he has been digging for gas tanks 46 feet long and 8½ feet high.

Quaker Notes

BY M. G. CONWAY

G. Y. Carpenter of Chester, Virginia, feels mighty proud of his grading outfit at Palmyra, Virginia. Under the supervision of T. L. Higgs a Bucyrus-Erie Gas + Air ably handled by Clev Hart and Bob Johnson, together with Caterpillar tractors hauling Western Crawler Dump Wagons, moved 44,800 cubic yards (Engineer's cross section figures behind



the shovel) during the month of May. They lost four shifts due to rain and worked on Sundays. Cleve Hart said "You know we feel a little chesty about this past month's work and think the boys in the Carolinas will have a mighty nice pace to make to follow us."

Harry T. Campbell Sons of Towson, Maryland, have fourteen miles of Maryland highways and shoulder under construction. They have also started a 125,000 cubic yard grading job for a municipal airport for the City of Baltimore.

GREAT LAKES
DREDGE & DOCK COMPANY
RIVER AND HARBOR IMPROVEMENTS
SOUTH CHICAGO, ILLINOIS

May 20th 1929

Mr. Thos. L. Gatke,
228 N. LaSalle Street,
Chicago, Illinois.

Dear Sir:

It is a pleasure to report upon the Moulded Swinging Frictions which you made up for our 30-B Bucyrus Diesel Shovel.

These Frictions were installed the early part of January 1929, and the Shovel placed into service immediately, and they have lived up to every claim you made for them. We have not experienced the slightest difficulty in swinging and the operation of the shovel has been speeded up tremendously. From the appearance of these frictions, and from our experience with Asbesgraphite on all of our other equipment, we believe these frictions will last years.

Thanking you for the personal interest shown and the effort you have made in solving this problem for us, we are

Yours very truly,
GREAT LAKES DREDGE & DOCK COMPANY
BY G. A. WIDSTRAND

GAW/GER

"—will last for years"

YOU, too, can solve friction troubles permanently by using *Asbesgraphite* on shovels, dredges, draglines, cranes, hoists, pavers, trucks, etc. This GATKE product has proved its ability to give longer life, trouble-free service, and ability to speed up operation, because of better and smoother control.

Asbesgraphite is self-lubricating, non-scoring friction material unaffected by heat, cold or moisture.

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Order Today.

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Remember—It is not Asbesgraphite unless it is marked "GATKE"

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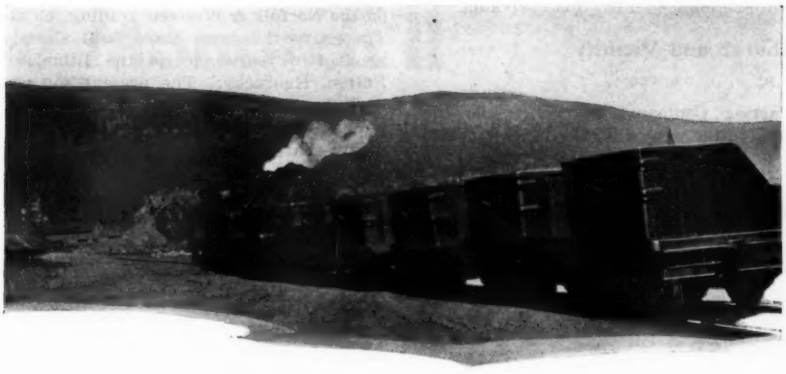
In writing to Thomas L. Gatke please use post card bound in the center of this number.



Consider Maintenance
Before Choosing a Locomotive

Maintenance of Shay Geared Locomotives is extremely simple because of Lima's care in designing and building the Shay so that repairs can be quickly and easily made to every moving part.

Many Shay parts such as sleeves and gears are made in one piece, reducing the number of bolts and largely eliminating one source of trouble.

The drive shaft, gears, pinions, valve gear, connecting rod brasses and all other working parts of the Shay are readily accessible for lubrication, adjustments and repairs when needed. Drop pits and extensive machine shop facilities are unnecessary with Shays handling your hauling.

Write for complete information on the maintenance-saving features and other advantages of the Shay.

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LIMA
***Shay Geared* LOCOMOTIVES**

SHOTS FROM THE FIRING LINE — Continued

Jafolla and Mark, Inc., of Philadelphia, are making fine progress with their track elevation job on the Reading Railroad at Manayunk, Philadelphia County, Pennsylvania.

Pittsburgh and Vicinity

BY J. S. WEAVER

Wilkinsburg Contracting Company, who have the contract for the excavation for the new Allegheny County building, have the work well under way.

Bill Hasley of the W. J. Hasley Company, reports good progress on their several contracts. Bill is well pleased with the Type "B-2" Bucyrus-Erie shovel installed some time ago.

R. H. Cunningham, Turtle Creek, Pennsylvania, are making the dirt fly on their P. & W. V. Railroad contract near Finleyville, Pennsylvania.

R. V. Baldwin, Coraopolis, Pennsylvania, has a large excavation contract well started on Coraopolis Heights. Bucyrus-Erie shovels and auto trucks are being used on this work.

H. W. Shaull & Sons, Mechanicsburg, Pennsylvania, report excellent progress on their Pennsylvania State Highway contract in Fulton County, Pennsylvania. Bucyrus-Erie steam and Gas + Air shovels are being used.

Bowman Bros., McKeesport, have added another Bucyrus-Erie steam shovel to their equipment.

Stanley Welheim is operating on the Gas + Air shovel owned by **H. W. Shaull & Sons** in Fulton County, Penn.

McCrady Brothers Company was successful bidder on Pennsylvania Railroad contract—constructing the approaches to Pennsylvania Railroad bridge on the East Pittsburgh-McKeesport Boulevard.

An important road improvement contemplated by the Pennsylvania Highway Department, announced by Secretary James L. Stuart, is the elimination of narrow passage through East Pittsburgh and the Turtle Creek Hill, both terrors to motorists from the Lincoln Highway. The work will cost $3,000,000. It is an improvement that was badly needed. The day of its completion will be greeted gladly by motorists from all parts of the country, who use the Lincoln Highway both east and west.

De Lloyd Thompson, the well-known Washington, Pennsylvania contractor, reports work going very well on his Baltimore & Ohio Railroad contract near Claysville, Pennsylvania.

German rail men are in Pittsburgh as guests of the Pennsylvania Railroad. Dr. A. Sarter, President Trier Division of the German National Railroads, and Dr. Theodore Kittle, member of the Central Administration of the German National Railroads, in charge of organization, were the guests of the Pennsylvania Railroad inspection tour of the Pittsburgh District. F. W. Conner, Passenger Traffic Manager, and Mr. W. R. Cox, Freight Traffic Manager, Pennsylvania Railroad, were their hosts while here.

D. W. Challis & Sons Co., Sewickley, was awarded the contract for the improving of the Highland branch of the Ingomar Road. The work will be started at once.

The R. M. Netherland Company have a 20-B Bucyrus-Erie shovel excavating for the new location of the Allegheny County Morgue. Albert Hendricks is operating the shovel.

Southern Notes

BY E. S. KIEFER

Nelson, Chase & Gilbert Company of Waverly, Ohio, are working their three Bucyrus-Erie 50-B Diesels and one P. & H. on the Norfolk & Western grading job near Grundy, Virginia. These are the same three 50-B shovels that made history about two years ago on the Illinois Central Cut-off near Fulton, Kentucky. The present job consists of widening a narrow gauge railroad to standard gauge and straightening it out at the same time. The machines are up against some mighty hard digging but are moving right along.

Mr. Sansom is general superintendent, with Mr. Adams superintendent of construction. Mr. Jones is in charge of the office at Grundy.

B. A. McMillin is operating a Bucyrus-Erie 175-B for the Lone Star Cement Company at Norfolk, Virginia.

Operator Ottis Newell, Wilmer, Alabama, recently called our attention to the record made by him with a Type "B" Bucyrus-Erie steam shovel working for the Richton Investment Company of Richton, Mississippi, loading gravel from a gravel pit. Mr. Newell loaded 40 cars averaging 27 to 30 yards to a car in a single day. This record was made in August, 1927. V. R. Walley is superintendent for the Richton Investment Company. The accompanying picture shows Mr. Newell and the B-2 on his present job, building roads for the Richton Investment Company.

Baltimore Notes

BY S. M. CHRISHILF

Catalana and Decora are low bidders at $176,000.00 on the Cold Spring Lane Grade Crossing Bridge for the City of Baltimore.

Ohio Notes

BY E. M. HEUSTON

Announcement has recently been made that there has been a change of ownership in the Contracting and Engineering firm of Arnold & Weigel, Woodville, Ohio. A. A. Weigel and associates have purchased the interest of V. Arnold, and will continue as a new organization under the same name and at the same address.

Detroit and Vicinity

BY P. M. RICHARDS

The Koenig Coal & Supply Company now have their second Bucyrus-Erie 50-B Ward Leonard shovel in operation. This machine is engaged in stripping at their Oxford, Michigan, plant B shown above. They have two 50-B Bucyrus-Erie electrics and one Bucyrus-Erie 30-B steam at this plant.

"Fill'er up! —the Monarch'll snake'er out"

ALLIS-CHALMERS A-C MILWAUKEE

..and out she comes!

When a Monarch-operating contractor tells the shovel man to fill an 8-yard crawler wagon, he *knows* the Allis-Chalmers-Monarch will pull it *anywhere!*

Heavy loads and soft footing mean nothing to the Monarch, on any contractor's job. The Monarch scrambles over big rocks, ploughs through deep mud and dust, eases itself up high banks and into deep fills with as little effort as a duck paddling around on a pond. Hook on any load—you can't stump Monarch strength and power!

Contractors should investigate all the distinctive features of the Allis-Chalmers-Monarch. It is built by an organization that has over 80 years' experience in building power machinery—*and that means something!* Write for literature and prices.

ALLIS-CHALMERS MANUFACTURING CO.
Specialists in Power Machinery Since 1846
MONARCH TRACTORS DIVISION SPRINGFIELD, ILL.

Allis-Chalmers
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SHOTS FROM THE FIRING LINE — Continued

Ray D. Baker was low bidder on 7-mile road section A east of River Rouge sewer. This work will be done in tunnel.

William J. Sheahan's Gas + Air machine is on a road job in Oakland County which involves approximately 70,000 cubic yards of excavation. The machine is being handled by Operator Buzzard who is making some exceptional records with this machine.

The Oakwood Construction Company and Thomas Nolan have been awarded a large sewer contract at Owensboro, Kentucky. We wish these gentlemen success in their venture out of the state.

Joe Lamet of Birmingham, Michigan, has just been awarded contract for the section of the Fox Creek Sewer extending under Jefferson Avenue in Detroit. This is known as the Jefferson Avenue section of this sewer.

W. J. Pratt of Flint, Michigan, is running a Lorain 75A for Joe Heystek, contractor, who is digging basements in and around Flint.

Business Ethics

Little Abie heard people talking about "Business Ethics" and asked his father the meaning of the term. "Well," said his daddy, "I will explain. A customer comes in the store and buys a six-dollar pair of shoes. He hands me a ten-dollar bill. On the way to the cash register I notice that there are two ten-dollar bills sticking together. Now, here's where the "business ethics" come in — should I tell my partner."

—Powell River Digester.

St. Louis Notes

BY A. J. KOENIG

The Owensboro-Rockport Bridge Co. has been granted authority by the Interstate Commerce Commission to build 12 miles of railroad and joint railway and highway bridge over the Ohio River.

The Kansas City Southern Railroad is preparing plans for a bridge across the Missouri River. A. N. Reece, Kansas City, Missouri, is Chief Engineer.

J. A. Ryan, Missouri Valley, Iowa, has a fresno outfit idle that he would like to put to work.

The Industrial Construction Co. have started on their contract of bank-widening in Michigan, Ohio and Illinois for the Wabash Railroad.

The Folz Construction Co. of Ripley, Tennessee, will begin construction of a city sewer system in Osceola, Arkansas, about July 1st. Their bid of $79,956 was the lowest of five bids submitted.

Nelson & Chase & Gilbert Co. were awarded the contract for grading the second track for the Big Four Railroad between Muncie and Anderson, Indiana. Tom Blythe will do the team work on this job.

A contract for 206,000 cubic yards of levee enlargement and removal of 5,000 yards of rock pavement on the Mound City front, Ohio River, was awarded to the Ward-Hayes Construction Co. of Cleveland, Ohio. The bid was approximately $102,880. Ward-Hayes now have an outfit busy on levee work at Cache, Illinois.

The Missouri Engineering & Contracting Co. of St. Louis, were the successful bidders for 150,000 yards of levee enlarge-

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LUBRICANTS

ARE DURABLE
AND ECONOMICAL

No. 52

is the correct grade for most bearings. Applied by compression cups or grease guns. Softer grades for high speeds. Stiffer grades for heavy duty. Resists shocks, pressures and weather.

ACHESON GRAPHITE CORPORATION
Unit of Union Carbide UCC *and Carbon Corporation*
NIAGARA FALLS, NEW YORK

Here the Track Machine is taking the place of a jack crew, raising the track on a railroad construction job.

Raising Track Without Jacks

This modern labor-saving development with its various attachments is suitable for any track raising, shifting, ballasting or steel re-laying job. Wherever used it has proven to be a great saver in time and labor. Its performance will surprise you.

Write for Bulletin GR-8.

NORDBERG MFG. CO., Milwaukee, Wis.

THE NORDBERG PATENTED
TRACK MACHINE

Erie Multi ~ Power Combination

A Bucket That Can Be Adjusted For the Kind of Material Being Dug

For rehandling — This bucket should be rigged up with 2 or 3 parts of line without counterweights. For easy digging 4 and 5 parts of line, and for hard digging and natural earth excavating 5 and 6 parts of line with counterweights. This bucket is faster with 6 parts of line than most buckets are with 4 and 5. This is due to the small amount of line overhauled.

Write for Photographs and Price

Ready for shipment in the ½ and ¾ cubic yard sizes only. Guaranteed to dig as well or better than any bucket offered today of equal size, weight and parts of line.

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HILLS-McCANNA FORCE FEED *Lubricators*

FORCE OIL to parts that need it

The bearings—gears—racks and pinions do the most work on your equipment—naturally they cause the most trouble when not oiled properly.

Keep them running smoothly with Hills-McCanna Lubricators—the positive means of oil delivery to parts that need it—regardless of location, resistance or temperature.

Types from 1 to 60 feeds for oiling all sizes of excavating and handling equipment.

HILLS-McCANNA CO.

2349-53 NELSON ST. *Chicago*

THE MOST COMPLETE SERIES OF ALLOYS FOR INDUSTRIAL USE
FORCE-FEED LUBRICATORS • PROPORTIONING PUMPS • TANK CAR VALVES

SHOTS FROM THE FIRING LINE — Continued

ment work in the Reelfoot district. The work known as piece number six was awarded to them at 31c per yard.

Sections 8a, b, c, d and e of Reelfoot Levee District were awarded to The Sweet Price Dredging Co. of Memphis at 28.4c per cubic yard. The total yards of these sections are 2,115,000.

William W. Roth, Hickman, Kentucky, was awarded section number five, St. Johns Bayou levee, 930,000 cubic yards at 20c per yard.

Winston Bros. Co. were awarded 250,000 yards of grading between Hornersville, Missouri, and Leachville, Arkansas, by the Cotton Belt Railroad. This is all side borrow work and will be done with team outfits.

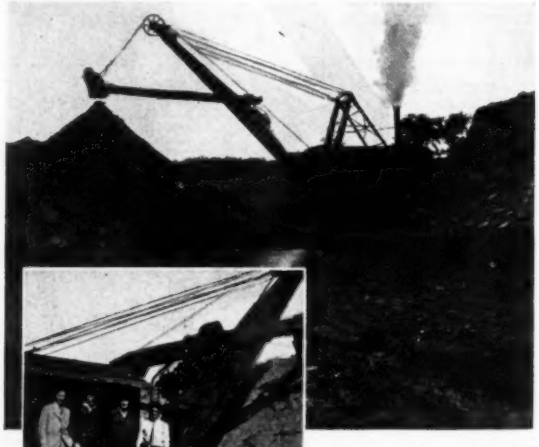
The Walsh Construction Co. were awarded contract by the Nickel Plate Road for the enlargement of the Collinswood yards at Cleveland, Ohio.

The Kansas City, Mexico and Orient Railway Co. has been granted permission to build an extension from Alpine to Presidio, Texas, a distance of 86 miles. H. E. Beard, Wichita, Kansas, is Chief Engineer.

Indiana Notes

BY E. S. KIEFER

The Williams-Wenner Coal Company at Boonville, Indiana, keeps their Bucyrus-Erie 50-B steam shovel working 24 hours a day. The machine strips two eight-hour shifts and loads coal one shift, and recently stripped 2730 yards in 16



hours, the overburden consisting of 8 feet of rock, 3 feet of shale and the balance clay making up a total depth of 30 feet. According to reports it is handling about as much as their 320-B.

J. M. Spillman, general foreman in charge of the operations, is shown at the right end of the group in the picture above. The others in the group are, from left to right, E. S. Kiefer, Clarence Zellefrow, fireman, and Bill Wenner, engineer. The upper photo shows the pit and the 320-B in the background.

The Warning

"Hey, Mike," said a workman to the other atop, "don't you come down on that ladder on the north corner; I took it away." — The Frisco Magazine.

"HERCULES"

RED-STRAND

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WIRE ROPE

The best recommendation for "HERCULES" (Red-Strand) Wire Rope is its service record, for after all—results are what count.

—But there are good reasons why this wire rope is able to give such exceptional results, some of which are:

(1) It is made of acid open-hearth steel wire.

(2) Every wire put into this rope is first rigidly tested by us to make sure that it meets our exacting requirements.

(3) It is backed by more than 40 years of wire rope manufacturing experience.

(4) Made in both Round Strand and Patent Flattened Strand constructions in order to meet all working conditions.

If you are not entirely satisfied with your wire rope results; if you want to minimize the time your equipment is idle due to rope changes; if you want maximum wire rope service for each wire rope dollar that you spend, we would like to have you give "HERCULES" a chance to show you what it can do.

The Wire Rope with the Service Record

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SHOTS FROM THE FIRING LINE — Continued

Illinois Shots

Operator Burton Moore of Rushville, Illinois, sends us the above picture showing himself and his Gas + Air out on an Illinois state highway job for Gaines Brothers, Inc. From March 1, 1928 to January 1, 1929 this shovel and one machine outfit moved 384,000 cubic yards of Class A and B dirt according to measurement by Illinois state highway engineers — quite some record we'd say. Mr. Moore has been on this Gaines Bros. Gas + Air for two years and says in writing us that he likes it far better than any other machine he has ever tried.

The Nineteenth Hole

"Pop," said the banker's boy, "you took a day off today, didn't you?"

"Yes, son. How did you know?"

The boy's nose wrinkled up a little, and he said: "You smell so of golf."

A Scotch traveling salesman, held up in the Orkney Islands by a bad storm, telegraphed to his firm in Aberdeen: "Marooned here by storm, wire instructions."

The reply came: "Start summer vacation as from yesterday."

The "Champion" Guaranteed to outdig and outlast any other bucket
G. H. WILLIAMS Co., 603 Haybarger Lane, Erie, Pa.
Branch Offices: New York, Pittsburgh, Chicago
WILLIAMS
FAST-DIGGING BUCKETS

Meeting Place of Capital and Labor

The **KOENIG LABOR AGENCIES**

Established 1875

ST. LOUIS
612 Walnut Street
Main 2766 and 2767

KANSAS CITY
501 Delaware Street
Main 0796

Help of All Kinds Furnished Free

Wisconsin Notes

BY C. W. HAY

James Hewer, operator, and Bucyrus-Erie 70-ton Railroad-type shovel number 979, recently celebrated their 20th anniversary of joint service with the Soo Line. Mr. Hewer, now located at Bruce, Wisconsin, has been in shovel service for the Soo Line 33 years, and the Bucyrus-Erie railroad shovel he operates has served satisfactorily for twenty-three years. It is, however, for the past twenty years that Mr. Hewer has operated this machine. The old timers operate beautifully together turning out about 100 cars of gravel ballast per day. Mr. Hewer is, of course, very proud of his long record and he is proud, too, of the machine with which he has been continually associated with for the past two decades. He certainly takes good care of the "old girl." She is as clean and neat as a new machine right from the shop and she operates with all the pep that goes with her youthful good looks.

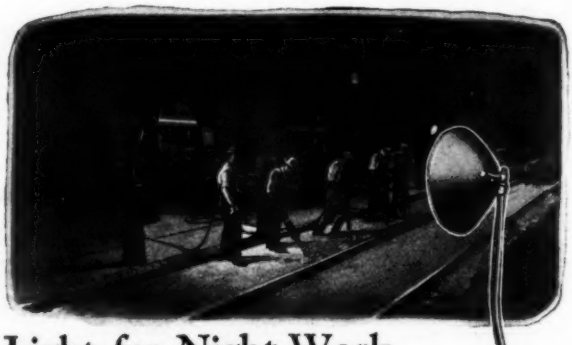
J. W. Dunphy who has been operating a Bucyrus-Erie 18B for the White Rock Silica Company at Browntown, Wisconsin, has recently been promoted to master mechanic.

Pacific Coast Notes

BY HARVEY L. LIVINGSTON

Up until within two weeks ago work has opened up very slowly but with the tremendous number of projects that have been planned and on which bids have been called for, it would appear that the **construction activities for the remaining months of the year will be on a very large scale.**

Contract was awarded to N. M. Bell, Berkeley, California, who bid $221,000.00 for 4.6 miles of concrete and asphalt paving from Sunnyvale to Santa Clara, Santa Clara County.



Light for Night Work

CLEAR white illumination . . . powerful light perfectly diffused . . . no glare . . . no dark shadow . . . ability to carry through smoke, fog, dust and rain. Carbic Light is the nearest approach to daylight in these qualities.

Contractors equipped with Carbic Flood Lights can depend on night work to keep up to schedule. Their night workmen can work as rapidly and as safely as their day force.

Carbic Flood Lights are low in first cost and inexpensive to operate. They fit in on any job. Simple —rugged—portable—always ready for instant service.

Work at Night with

CARBIC LIGHT

OXWELD ACETYLENE COMPANY
Unit of Union Carbide and Carbon Corporation

NEW YORK CITY: Carbide and Carbon Bldg. CHICAGO: Carbide and Carbon Bldg.

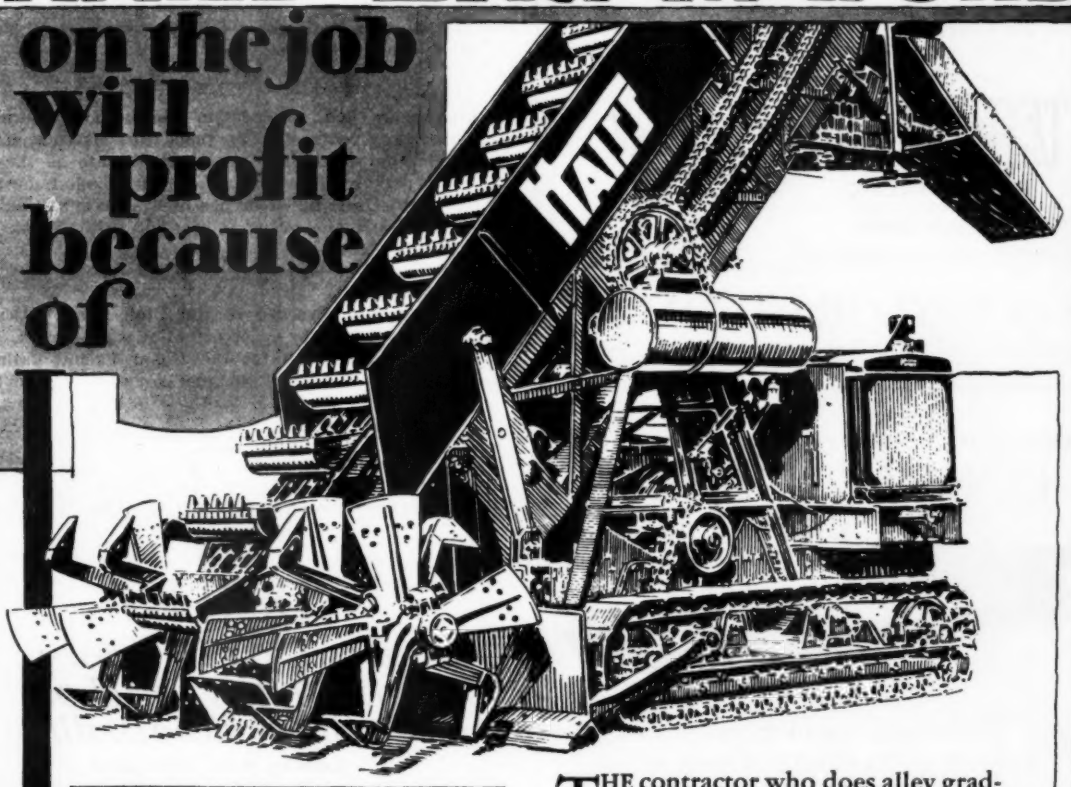
SAN FRANCISCO: Adam Grant Building

CARBIC

Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.

CONTINUOUS

The Man who puts HAISS EXCAVATORS on the job will profit because of



THE contractor who does alley grading, road widening—all grading before the paver, stripping, and direct bank digging, can profit by using the Haiss Excavator's ability to Dig Continuously at 1¾ to 2 cubic yards per minute.

Ask for your copy of the new bulletin.

GEORGE HAISS MANUFACTURING CO., Inc.
144th Street and Park Ave. New York, N. Y.
Representatives in Principal Cities

It's CONTINUOUS DIGGING

CHAIN THE STRONG LINK OF INDUSTRY THE CHAIN INSTITUTE

SLING CHAIN DRAGLINE CHAIN

Right as to
Quality — Service — Price

For your Sling and Dragline Chains always order "Taylor Made".

Service in Taylor chain is assured by the higher quality of the product, which gives you longer, surer service in the field. Since 1873 Taylor has been manufacturing the finest quality of chain that science can build or money can buy. Every link is proof tested and branded for your protection. At the factory large stocks of raw material and the finished material are carried for instant filing of your orders.

"Taylor Made" chain and fittings can be obtained from your local mill supply house or local mill supply jobber.

KEEP EXTRA CHAIN ON HAND FOR EMERGENCY

TAYLOR MADE
HAND-ELECTRIC AND MACHINE WELDED CHAIN

S. G. TAYLOR CHAIN CO.

Established 1873 P. O. Box 117-B. Hammond, Indiana

SHOTS FROM THE FIRING LINE — Continued

Gist and Bell, Arcade, California, bid $127,029.00 and were awarded contract for 3.8 miles of grading from San Bernardino County. This job includes 401,500 cubic yards of roadway excavation on which this company will use their Gas + Air Bucyrus-Erie shovel.

M. S. Ross, Los Angeles, California, who bid $220,323.00, was awarded a contract by the Los Angeles County Board of Supervisors for improving Glendora Mountain Road comprising 600,000 cubic yards of excavation over a length of 5.17 miles.

The U. S. Government is proceeding vigorously with their work at the **Naval Ammunition Station, Hawthorne, Nevada,** and have just awarded contract to Butte Electric and Manufacturing Company of San Francisco for furnishing and installing electrical equipment for 4000-volt transmission line 13,600 feet long at Hawthorne.

Continuous bad weather in Northern California has bothered many contractors on their work as snow has been falling in the mountain ranges even as late as the 5th of June and has compelled many shovels to shut down until better weather sets in. This has been a most unusual occurrence as construction work is generally at its peak at this time of the year.

Contract was awarded to the Utah Construction Company, Ogden, Utah, for construction of a side track, channel change and yard work for the Union Pacific Railroad at Green River, Wyoming. Estimated cost of this job is $80,000.

Move your heavy equipment
QUICKLY AND SAFELY
with your own trucks

With trailers of from 20 to 75 tons capacity, equipped with six or more rubber-tired wheels, you can carry your shovels and other heavy equipment quickly and safely from job to job. Save valuable time and save your equipment from expensive and unnecessary wear. These extremely sturdy and well-built units have cast steel wheels, Timken roller bearings and internal expanding brakes.

May we furnish you complete information?

BUCYRUS-ERIE COMPANY

BUCYRUS ERIE

Specialty Department
South Milwaukee, Wisconsin

THE SANDERSON CYCLONE DRILL CO., ORRVILLE, OHIO

DRILLS

and drill tools for every kind of Big Blast Hole Drilling

Catalog Mailed on Request

Page Diesel

Designed Exclusively for EXCAVATORS
4 CYCLE
HORIZONTAL
TWO CYLINDERS

PAGE ENGINEERING CO. 844 RUSH ST. CHICAGO — ILL.
DRAG SHOVELS — DRAG LINES — BUCKETS — SLACK LINES

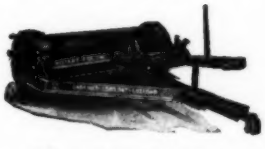
Western

Dump Cars and Grading Equipment

Drag Scraper made in 3 sizes

Fresno Scraper in 5 sizes

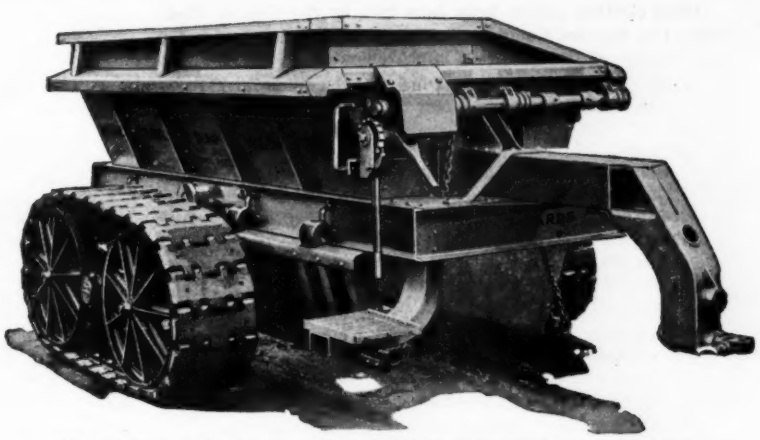
Wheeled Scraper in 5 sizes



Rotary Fresno in 2 sizes

Tumblebug Scraper, capacity 1 cu. yd.

1½-yd. and 2-yd. Contractors' Dump Wagon



A 7-yard Western Crawler Dump Wagon with direct tractor hitch. This is one of the six sizes and combinations of Western Crawler dump wagons

MORE DIRT *per* HOUR
with . . . .
Western Crawler Dump Wagons

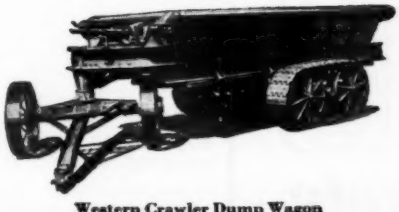
WESTERN CRAWLER DUMP WAGONS have made a 24-hour day possible. They have made work in the mud of early spring and late fall possible. They have reduced the number of idle days in wet weather.

In addition to increasing the number of hours of production, Western Crawler Wagons increase the production per hour. The greater speed and efficiency of motorized outfits of large units speed up delivery.

You will find it difficult to compete against an all weather, 24-hour per day Western Crawler dump wagon equipped outfit. Write for Bulletin 29-AK that gives the whys and wherefores.

WESTERN WHEELED SCRAPER COMPANY
AURORA, ILLINOIS, U. S. A.

WESTERN



Western Crawler Dump Wagon
5, 7 and 10-yd. capacities

Levee Special Elevating Grader
Handles mud or sand

SHOTS FROM THE FIRING LINE — Continued

Bond election will be held June 18th by the City of Pasadena, Los Angeles County, to vote $10,000,000 bonds for the construction of the following improvements:

DAM — To be located at Pine Canyon Side in San Gabriel Canyon to be 295 feet high above canyon floor and 377 feet high above foundation base, involving in the main:

420,000 cubic yards excavation
720,000 cubic yards concrete
682,000 barrels portland cement
1,500,000 pounds reinforcing steel
1,000,000 pounds structural steel
1,250,000 pounds gates, valves, etc.

CONDUIT — 19.8 miles in length from Pine Canyon to Mountain Street Reservoir, consisting of:

14,000 lineal feet concrete pressure tunnel
56,000 lineal feet 60-inch steel pipe line
24,100 lineal feet reinforced concrete pipe line.

S. B. Morris is Chief Engineer of Water Department.

How to Grow Old

"To what do you attribute your great age?"

"Well, fer the first seventy years of my life they wasn't no automobiles, an' fer the last twenty-five I've been confined to the house." — Carl Anderson in Life.

The Difference

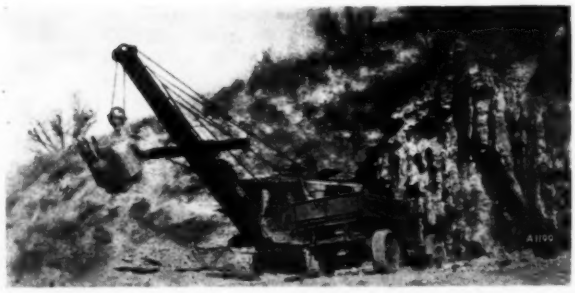
Rastus: "I tells you, Sambo, I done found out de difference between men and de women at las'."

Sambo: "What — what is it?"

Rastus: "Wall, a man'll gib two dollars for a one dollar thing dat he wants, an' a woman'll gib one dollar fer a two dollar thing she don't want!"

Los Angeles and Vicinity

BY WM. E. HAUSSEN



Art Yetter has been using his Bucyrus-Erie Gas + Air on real estate development work in and around Hollywood. The above picture shows the shovel on a Hollywood subdivision for Blair Lyle Company. The job consisted of cutting new roads through virgin country, the nature of which was shale, decomposed granite and hard rock. In all, a total of 60,000 yards was moved which was done in 3½ months single time shift. Many of the grades encountered were from 15 to 18%. The Pioneer Roadway to get into the job, was nearly 30% grade. This work was done during the winter time and but three days were lost due to bad weather.

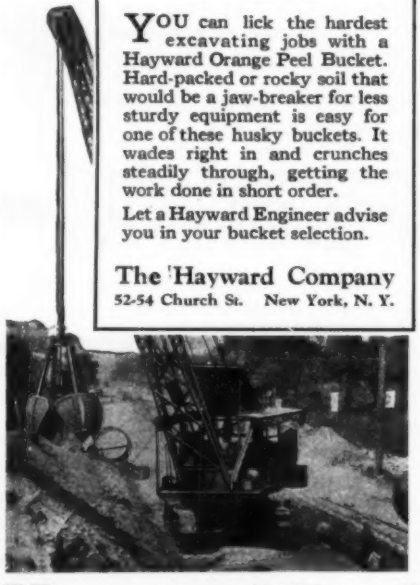
The project started at Ventura Boulevard, north of the Hollywood Hills, and ended on the top of the Hollywood Hills at the intersection of Mulholland Drive and Dixie Canyon. Mr. Yetter is high in his praises for the performance of the Gas + Air machine.

Where the Going Is Tough

YOU can lick the hardest excavating jobs with a Hayward Orange Peel Bucket. Hard-packed or rocky soil that would be a jaw-breaker for less sturdy equipment is easy for one of these husky buckets. It wades right in and crunches steadily through, getting the work done in short order.

Let a Hayward Engineer advise you in your bucket selection.

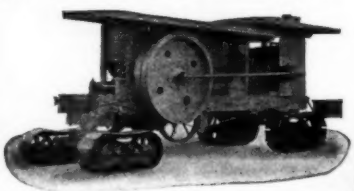
The Hayward Company
52-54 Church St. New York, N. Y.

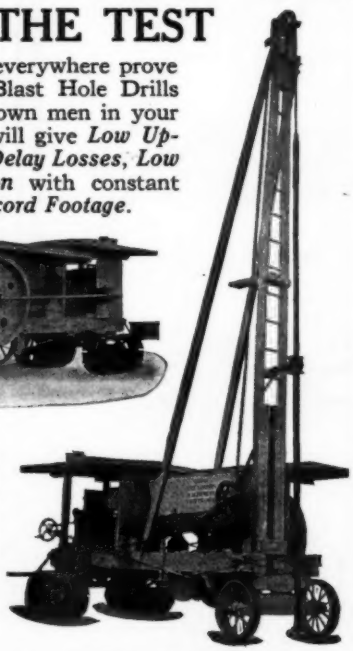


Hayward Buckets

Loomis "CLIPPER" Drills
STAND THE TEST

Satisfied owners everywhere prove that "Clipper" Blast Hole Drills handled by your own men in your own rock strata will give *Low Upkeep Cost, Low Delay Losses, Low Rate Depreciation* with constant production of *Record Footage.*





They will save you money in your blast hole drilling month after month and year after year. Your shovels will not need to wait on the "Clippers".

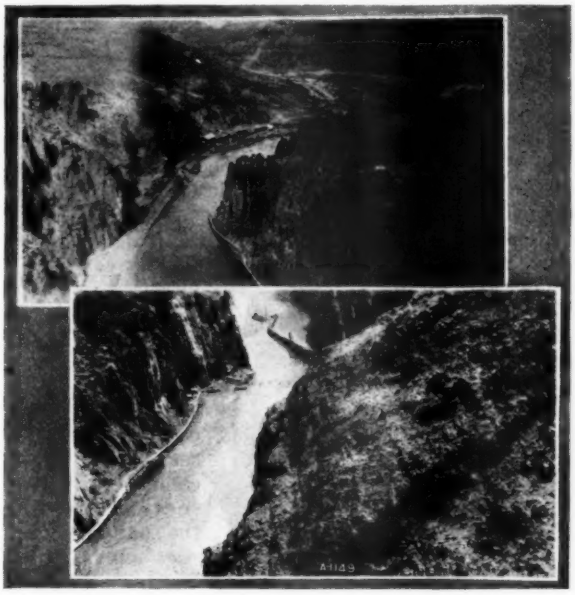
Write us for detailed information.

THE LOOMIS MACHINE CO.
(*Established 1842*) K Street, Tiffin, Ohio

SHOTS FROM THE FIRING LINE — Continued

Oregon Notes

Frank A. Mengel, dragline operator, who has been with the General Construction Company of Seattle for the past seven years, is now on the Ouhyee Dam Project at Nyssa,



Oregon. Mrs. Mengel sends us the above picture, showing the start of the project. The upper view shows the camp from the top of the dam site. Lower view shows tunnel mouth and dragline Mr. Mengel is erecting in the distance.

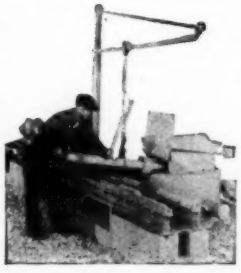
Taped Primer Prevents Missed Hole

In making up primers by the usual method of lacing the fuse through or tying it on to a stick of dynamite, there is usually a possibility of a cap slipping out of place or becoming detached from the fuse and therefore causing a missed hole. This difficulty may be avoided by using ordinary electricians' tape to fasten the fuse and cap to the dynamite. To prepare primers by this method make a hole diagonally in the side of the stick of dynamite with the cap crimpers, and insert the cap with the fuse attached into this hole. Then secure the fuse to the stick with several wraps of electricians' tape wound on the fuse and then bound around the cartridge.

Primers carefully prepared in this manner are practically sure of arriving at the bottom of the hole in good order.

THE ARMSTRONG

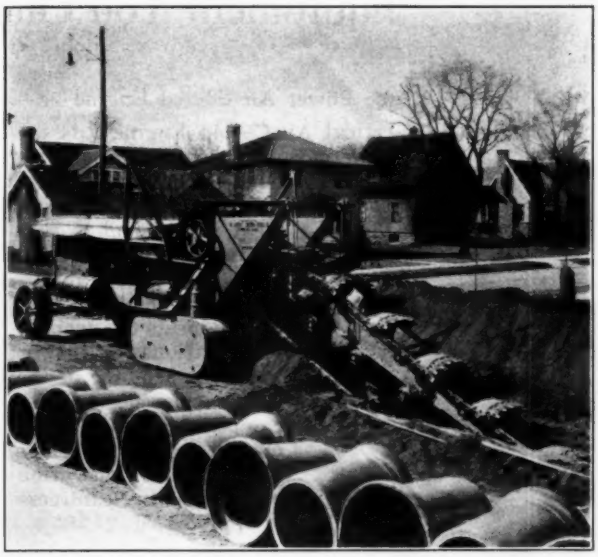
BIT DRESSER



Churn drill bits sharpened on an Armstrong Bit Dresser will cut from 30% to 100% faster. This has already been proven in more than 150 quarries and open pit mines to their profit.

See P. & Q. Handbook, page 71, 1928
Keystone Metal Quarry Cat., page 160

ARMSTRONG MFG. CO.
921 Chestnut St. Waterloo, Iowa



ENDURANCE

THE ABILITY TO STAY WITH THE JOB RETARDS MECHANICAL DEPRECIATION-MULTIPLYING THE YEARS OF SATISFACTORY SERVICE

Will it do the work, and how long will it continue to give satisfactory service? These are the questions that every purchaser of construction equipment must find an answer for before he knows whether or not he is making a wise investment. With over thirty years' mechanical and engineering experience back of its production, it is logical to assume that Buckeye Trench Excavators are designed exactly to meet every practical requirement. The performance records of thousands of these units, in a multiplicity of fields, prove beyond question their ability to stand up and deliver a maximum production at a minimum cost over an exceptionally long period of time.

Some of the outstanding Buckeye construction features are: the slow speed, heavy duty gasoline motor; power shifted conveyor (dumping on either side to clear side obstructions); positive bucket cleaning in any soil; digging chains of heavy manganese steel; double drive to digging chains (through differential gearing); all-steel gears cut from solid steel blanks and heat treated; power steering; multiple digging speeds, making maximum production possible in varying soils; and Alligator (crawler) traction, equipped with positive brakes for safe operation on grades.

Write for complete construction details and performance data. Interesting literature sent on request.

The Buckeye Traction Ditcher Co.
FINDLAY, OHIO

There's a Buckeye Sales and Service Office Near You

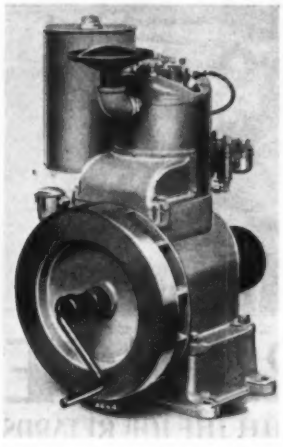
for over thirty years Buckeye

Equipment You Ought To Know About

(Continued from page 304.)

New 1½ Horse Power Air-Cooled Engine

The Lauson Vertical Air-Cooled Engine fills the increasing demand for a motor built on automotive lines, but not too heavy in weight, and with working parts substantial enough to give continuous service.



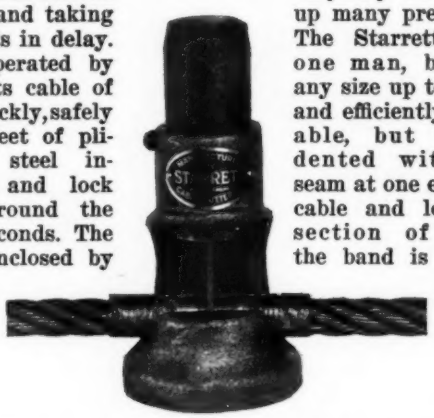
Neat, compact, self-contained construction makes it readily applicable to portable units. It also meets the demand of stationary power users for a motor of the higher class design that can be installed on water or light unit in camps where quiet operation coupled with cleanliness is appreciated.

Features of the machine of interest are: mechanically-driven fly-ball governor enclosed in dust-proof housing, roller bearing construction, heavy counterbalanced crankshaft, one-piece drop-forged camshaft, connecting rod interchangeable with Ford Model T rods, grey iron piston, high tension Wico magneto, cooling system provided by fan in the engine flywheel, hot spark when cranking due to special magneto construction, and Hutto ground cylinder. The engine weighs 170 pounds and is 24½ inches high. Speed is 900, 1400 revolutions per min.

The manufacturers are *John Lauson Manufacturing Company, New Holstein, Wisconsin.*

Improved Cable Cutter

A problem which has ever been an annoyance in the construction industry — that of binding and cutting steel cable has been simplified by a new device, the Starrett Steel Band and Cable Cutter. Formerly the cutting of steel cable has been regarded as a tedious and dangerous operation, resulting in frayed ends, often serious injury to the hands, and taking up many precious moments in delay. The Starrett device, operated by one man, binds and cuts cable of any size up to one inch quickly, safely and efficiently. A thin sheet of pli-able, but very tough, steel ingroove and lock dented with a seam at one end is bent around the cable and locked in 20 seconds. The section of the cable enclosed by the band is then



placed in the cable cutter and quickly severed by striking with a sledge, leaving the seizing or whips on both cut ends. The peculiarly shaped blade and die of the Starrett Cable Cutter prevents flattening of the cable in the process of cutting and retains the lay of the strands and the natural shape of the cable.

The one-inch Starrett Cable Cutter is very compact, weighing only eight pounds. It is 6 inches high, 3½ inches in diameter at the base and is carried conveniently.

The Starrett Steel Bands and Cable Cutters are very moderately priced and are made by the *Morse-Starrett Products Co., 1916 Broadway, Oakland, California,* who will be glad to furnish further information.

MOON Steam Fan
18" diameter

Here's Something for that Summer Slump!

A MOON Steam Fan on your steam shovel or drag-line will bring your summer output back up to par — because it keeps the operator cool so he can work at his best.

One contractor told us that this fan increased his production 25%.

Easily installed on your steam line—uses but very little steam — requires no attention or upkeep.

Write for Bulletin No. 2-M which gives full details.

THE MOON MFG. CO.
108 NO. JEFFERSON STREET
CHICAGO

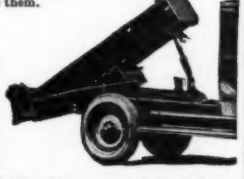
Put An "IRON MULE" on the Job

It Licks Trucks and Teams

This is the 2-yard "Iron Mule."

"IRON MULES" for years have made phenomenal profits for dirt-moving contractors. There are 2 sizes — the 4-yard with power hoist dump and crawler tracks, and the 2-yard with gravity dump. These sensational dirt haulers will get where trucks and teams can't go. Write for illustrated broadside that fully describes them.

There's a 4-yard with crawler tracks also.



Dump Bodies Too

HUGHES-KEENAN Dump Bodies for all makes of light trucks are famous wherever dump bodies are used. Made in 1 and 1½ yard sizes, equipped with gravity dump, underbody hand hoist or power hoist. Write for descriptive folder.

THE HUGHES-KEENAN CO. Mansfield, Ohio

you will appreciate this!

The plant you see below produces wire rope—nothing else. Their employees are trained specialists in building a quality product.

If we could visualize to you our vast distributing organization throughout America, you would understand why

WILLIAMSPORT WIRE ROPE

Telfax Tape Marked —Factory Certified

has become so much preferred by men who "know their ropes."

But its growth is due not alone to the superior, uniform quality of material and the service we give in every field, but to the PROTECTION against substitution of ropes of the wrong grade (tensile strength) by use of the Telfax System of tape marking. This or any such protection is obtainable in no other make of wire rope.

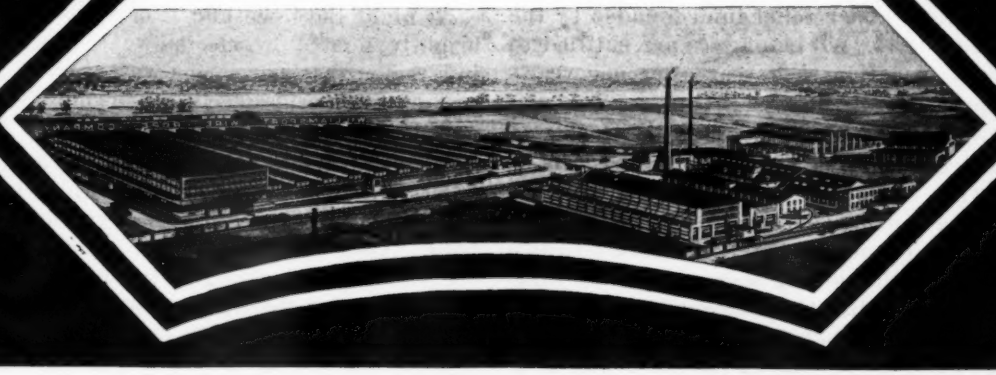
Let us show you how this protection is worth to you more than the rope costs—and it costs nothing to get.

WILLIAMSPORT WIRE ROPE COMPANY

Main Office and Works: Williamsport, Pa.

General Sales Offices: Peoples Gas Bldg., Chicago

The Largest Exclusive Wire Rope Plant in America



In writing to Williamsport Wire Rope Co. please use post card bound in the center of this number.

In the Land of the Midnight Sun

(Continued from page 291.)

Left: Bucyrus-Erie 120-B electric loading ore, Bucyrus-Erie railroad-type machine in the background. Center: Cutting up through a bank of the high-grade Kiirunavaara ore. Right: So successful has been the operation of these Bucyrus-Erie four-yard electric shovels that two additional machines have been ordered recently.

77,000 volts. A steam plant is available at the mine for generating electricity for emergency demands.

At Luossavaara Hand Mining Used in Ore Body of Twenty-Two and One-Half Million Tons

Luossavaara, the smaller mine, is operated by hand loading methods. This ore body dips 65 to 70 degrees E. S. E. and the ore quantity is estimated as 22,500,000 tons above the lake level. The ore is loaded into 3-ton cars, dumped into shafts, loaded into 12-ton cars and hauled by electric locomotives to ore pockets at the head of a double tracked inclined railway handling 20 to 25-ton cars which are braked down to a 2000-ton pocket. From this pocket the ore is loaded into railway cars. Drilling and blasting methods are the same as at Kiirunavaara, air being supplied by an Atlas Diesel compressor.

Comfort of Employees Given Careful Consideration

At both mining fields and at the work shops there are buildings equipped with lockers and showers for use of employees. The building at the Kiruna Mountain can accommodate 900 men and the one at Luossavaara, 200. All employees are insured against accident and every man is obliged to contribute to a sick relief fund founded by the miners themselves. All employees are entitled to a two-weeks vacation each year after one year's employment.

The operating company, Trafikaktiebolaget Grangesberg Oxelosund (usually referred to as "T. G. O.") acquired control of the original Luossavaara Kiirunavaara Aktiebolaget in 1903. Plans for the community of Kiruna were drawn up even before the mining began, and were sanctioned by the Swedish Government in 1899.

Kiruna, lying on the slope of Hauki Mountain, with its 14,000 population, is the finest and most modern mining town in Europe. Its electric street car line would make any American city proud. Employees of the mine may ride free of charge. Various groups of company houses built of wood with sawdust between the walls to keep out the cold are separated by brick walls as a fire protection. Electricity is used for lighting, heating

A street in Kiruna above the Arctic Circle, with the school house at the top of the hill.

and cooking. There are four moving picture theatres where American films are exceedingly popular. The townsfolk are most proud of their churches and schools, there being three community and four vocational schools.

At night the town and iron ore mountains are brightly lighted by electricity — a unique sight in a region that was once a waste cut off from the rest of the world by rivers, swamps, mountains and Arctic cold.

Radio furnishes entertainment in many of the homes, Kiruna having its own broadcasting station, bringing its programs in by wire from Stockholm. Association football is a popular sport in the summer and skiing is the favorite of young and old during the eight months of winter.

The town boasts only one cow which enjoys the unique distinction of being the one and only

bovine milk producer in the territory. The waste regions of the Arctic thereabouts can support only Lapps, reindeer, and iron ore miners.

The chief figure in the development of Kiruna as an outstanding community, not only in Sweden

Ore benches at Kiirunavaara with Bucyrus-Erie 35-B in lower cut, German shovel on second cut and Bucyrus-Erie railroad-type shovel on third cut.

but in the modern industrial world, was Dr. Hjalmar Lundbohn. As managing director of the mines he devoted himself, heart, soul and pocketbook, to the welfare of the people of Kiruna.

Wrong Department

Jane: "I want a shorter skirt than the one you showed me."

Clerk: "That is the shortest we have. Have you tried the collar department?" — Purple Parrot.

Experimenting Is Expensive

THERE are many different sources from which you can secure the ordinary supplies for your shovel, dragline or crane. It is obvious, however, that nowhere else can you find the same intimate knowledge of your equipment and the same interest in its successful performance that you can find in the organization of the manufacturer of the machine.

The BUCYRUS-ERIE SPECIALTY DEPARTMENT is in a position to furnish your Bucyrus, Erie or Bucyrus-Erie machines tested supplies such as:

WIRE ROPE	BRAKE LININGS	RAIL CLAMPS
ROPE SOCKETS	WOOD BLOCKS	RAIL CHAIRS
ROPE CLIPS	ASBESTOS FABRIC	RAILS
HOISTING CHAIN	ASBESTOS BLOCKS	BRIDLES
COLD SHUTS	FIRE BOX ARCHES	SUCTION HOSE
PATENT LINKS	FUEL HOISTS	OIL PUMPS
SYPHONS	DIPPER TRIPS	DRAIN VALVES
INJECTORS	STEAM FANS	JACKS

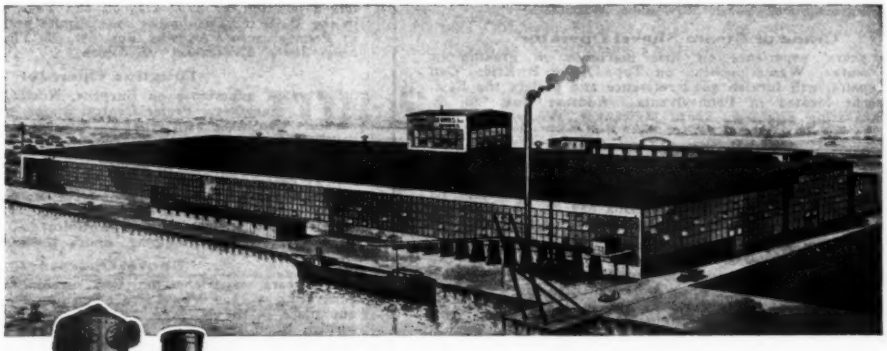
ASBESTOS PACKINGS
FLEXIBLE METALLIC PACKINGS
MOULDED METALLIC PACKINGS
OIL-BURNING EQUIPMENT
POWER TRANSMISSION CABLE
DRAGLINE ROLLERS

Why Experiment? Send us your order.

BUCYRUS-ERIE COMPANY

BUCYRUS ERIE

SPECIALTY DEPARTMENT
South Milwaukee,
Wisconsin



Boilers to Meet Every Engineering Need

When you have a new job, different and difficult — when you must work in a new location under difficult working conditions — no matter what the job, we can build a boiler to meet your needs — a boiler that will give you power, speed, durability, rugged strength and efficiency.

Johnston Boilers have proven their value on engineering projects the world over. They are built by an organization that has been building good boilers for over 65 years. When you have a boiler problem you may find our experience worth while. Call on us then.

JOHNSTON BROS., Inc., Ferrysburg, Mich.

POSITIONS WANTED

Space under this heading is available at $4.30 per inch or fraction thereof.

Shovel Operator

15 years' experience on Marion and Bucyrus machines on levee, ditch and road work. Wants position on Bucyrus 50-B anywhere in the U. S. A. Can make repairs, will furnish good reference, at present located in Indiana. Address Box 751, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Operator

41 years old and married. 12 years operating experience on Bucyrus, Marion, Erie, Northwest and Monighan at highway, drainage and irrigation work. Will work anywhere in the U. S. A. Can make repairs. Furnish good reference. At present located in Washington. Address Box 761, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Operator

3 years' experience on Erie type B-2 machine at highway work. Will work anywhere in the U. S. A. Can make own repair. Will furnish good reference and at present located in Tennessee. Address Box 752, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel or Dragline Operator

15 years' experience on Marion No. 360 Dragline, Bucyrus 100-B, Marion No. 37 Electric and Erie Steam at coal stripping and quarry work. Will work anywhere in the U. S. A. Can make own repair. Will furnish good reference. At present located in Pennsylvania. Address Box 753, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Engineer

12 years' experience on Bucyrus 175 and 320-B stripping coal. Will work anywhere in the U. S. A. Can make repair. Will furnish good reference. At present located in Oklahoma. Address Box 754, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel and Dragline Engineer

20 years' experience on Bucyrus and Marion at quarry and construction work. Wants position on any kind of machine anywhere in the U. S. A. Can make repair and furnish good reference. At present located in South Carolina. Address Box 755, % The Excavating Engineer, South Milwaukee, Wis. 1

Shovel Engineer

23 years' experience on all type machines at road work, sewer construction and foundation work. Wants position on Erie machine near Indiana. Can make repair, furnish good reference and located in Maryland. Address Box 757, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Crane or Steam Shovel Operator

12 years' experience on Erie machines on grading or quarry work. Wants position on Type A or B Erie. Can make repairs, will furnish good reference and prefers the East. At present located in Pennsylvania. Address Box 758, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Small Shovel Operator

5 years' experience on Bucyrus-Erie 30-B and 50-B on road work. Would like position on a 30-B anywhere in the U. S. A. Can make repair and furnish good reference. At present located in Florida. Address Box 659, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Operator

20 years' experience on Erie and Norton machines. Can make repairs and wants grading work on Erie machines anywhere in U. S. A. At present located in Indiana. Address Box 760, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Operator

Experienced steam or gasoline shovel operator who can cut grade, slope and get yardage. Not afraid of work. Can furnish best of references and can do own repair work on either machine. Present location in Alabama. Address Box 750, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Shovel Operator

15 years on all type Erie machines at grading and quarry work, can make repair, will furnish good reference and work anywhere in the U. S. A. At present located in Virginia. Address Box 756, % The Excavating Engineer, South Milwaukee, Wisconsin. 1

Dragline Operator

Eleven years' experience on steam and Diesel machines. A-1 repair man, will go anywhere and can operate any dragline. Prefer 50-B, Bucyrus-Erie. At present located in Illinois. Address Box 674, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Shovel Operator

20 years' experience on Marion, Bucyrus and Erie machines on stripping work. Will take any kind of a position on an Erie machine any place in the U. S. A. Can do own repair work, furnish good reference and at present located in Illinois. Address Box 676, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Shovel, Dragline or Dredge Operator

15 years' experience on mine stripping, levee and drainage work. Will take position on any type of machine anywhere in the U. S. A. Can make own repairs, can furnish good reference and located in Illinois. Address Box 677, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Shovel Operator

2 years' experience on Bucyrus machine on road and levee work. Desires position as engineer on 50-B Diesel anywhere in the U. S. A. At present located in Texas. Address Box 678, % The Excavating Engineer, South Milwaukee, Wis. 2

Shovel or Crane Operator

15 years' experience on Bucyrus, Erie and Marion railroad-type and Whirley machines at highway, railroad, streets and foundation work. Desires position on shovel or crane, Bucyrus-Erie preferred, anywhere in the U. S. A. Can make own repairs and furnish good reference. At present located in Virginia. Address Box 679, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Shovel Operator

10 years' experience on all makes of steam shovels on railroad, basement and grading work. Desires any kind of position on any type of machine in Canada. Can make own repairs, furnish good reference and at present located in Canada. Address Box 675, % The Excavating Engineer, South Milwaukee, Wis. 2

Steam Shovel Operator

Married, with 4 years' experience on Erie machine on loading gravel work. Will work anywhere in the U. S. A. Can make repairs, at present located in Ohio. Address Box 653, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Gas Shovel Operator

Married and 3 years' experience on Northwest machine on all kinds of work. Can make own repair and furnish good reference. Now located in Virginia. Address Box 655, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Hydraulic Dredge Operator

10 years' experience on Bucyrus dredge at general work operating and repairing. Would like a position anywhere in the U. S. A. Can furnish the best of reference and located at New York. Address Box 681, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Crane or Shovel Operator

15 years' experience on Bucyrus, Marion, Erie, Osgood and Thew machines. 41 years of age and married. Has experience on highway, railroad grading and rock excavation work. Prefers a position on Erie, Osgood and Thew machines anywhere in the U. S. A. Can make own repairs and at present located in Pennsylvania. Address Box 682, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Dragline Operator

8 years' experience on Bucyrus, Northwest, Monighan and P. & H. machines. Prefer Central States, now located in Wisconsin. Can make own repairs. Address Box 656, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Dragline or Shovel Operator

23 years' experience on Bucyrus, Erie, Marion, Thew, Osgood and Northwest on all kinds of work. Can do his own repair work and furnish good reference. 42 years of age and married. At present located in Colorado. Address Box 684, % The Excavating Engineer, South Milwaukee, Wisconsin. 2

Shovel Operator

6 years' experience on Erie machine on cellar and road excavating work. Would like a position on Erie Type A or B any place in the U. S. A. Can do his own repair work and furnish good reference. Now located in Michigan. Address Box 555, % The Excavating Engineer, South Milwaukee, Wis. 3

OPERATORS WANTED

Slack Lime Excavation Operators for work at Tin Mine, Bolivia, South America; 3-year contract, transportation both ways and salary while traveling paid by Company. In reply give complete details. Address G. J. C., Room 304, No. 240 Broadway, New York City.

WANTED

Dragline Operators Wanted

Single men for positions in Central and South America. Only those with experience in operating Diesel powered draglines need apply. Write fully, stating age and Diesel dragline experience, to: United Fruit Company, One Federal Street, Boston, Massachusetts. (Employment Dept.)

Steam Shovel Engineers Wanted

Single men for position in Central and South America. Prefer those with some experience in operating Diesel powered shovels. Write fully, stating age and experience in operating steam and Diesel powered shovels, to: United Fruit Company, One Federal Street, Boston, Massachusetts. (Employment Dept.)

BOOK REVIEWS

The United States Bureau of Mines has recently issued a bulletin number 299 entitled **"Metallurgical Limestone"** which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the price of ten cents. Enormous quantities of limestone are employed by modern metallurgy, especially for fluxing. Approximately 24,000,000 tons are used in the United States annually. Most limestone producers have little knowledge in the way their stone is used in metallurgy. More complete knowledge would enable limestone operators to solve their production problems more intelligently.

The purpose of "Metallurgical Limestone" is to cover as completely as possible the present knowledge of the utilization of metallurgical stone and the problems connected with its quarrying or mining and preparation. It will prove valuable to both quarry operators and metallurgists.

Engineering Bulletin No. 6 entitled, "The Bituminous Macadam Pavement," by A. T. Goldbeck, Director of the Bureau of Engineering, is now ready for distribution by the National Crushed Stone Association, Merchandise Building, Washington, D. C.

The bulletin discusses in detail the bituminous macadam pavement and should be exceedingly valuable in stimulating the increased use of crushed stone in this important type of construction. In the introduction of the bulletin Mr. Goldbeck comments as follows:

"Although the merits and usefulness of bituminous macadam pavement are well known in many localities, they are not yet fully realized in others. It is a comparatively new type of construction, and was developed to produce a road surfacing which would not ravel under automobile traffic and which would be dustless. When properly designed and carefully constructed, it is an excellent pavement, well fitted for the needs of present-day traffic. It is the aim of the present article to give helpful facts to those interested in bituminous macadam pavements."

The American Road Builders' Association have recently issued a reprint from their 1929 Proceedings containing articles on **"Subgrades and Pavement Bases"** by C. A. Hogentogler, Senior Engineer of the United States Bureau of Public Roads, **"Highway Finance"** by Charles M. Upham, Secretary-Director of the American Road Builders' Association and **"The Practical Application of Recent Highway Investigations"** by A. T. Goldbeck, Director of the National Crushed Stone Association. The booklet is liberally illustrated.

The use of Toncan Iron in perforated, corrugated iron underdrains is described in booklets recently published by the **Canton Culvert & Silo Co., Canton, Ohio, and the Toncan Culvert Manufacturers' Association, Massillon, Ohio.**

Both booklets deal with the general problems of drainage, and contain technical and practical discussion of the design and application of Toncan copper molybdenum iron drains. Toncan Iron is manufactured by the Central Alloy Steel Corporation, Massillon.

The American Chain Company, Inc., has just issued an interesting and helpful pamphlet on chain.

In it are tables showing the number of links per foot, weights, proof tests and safe working loads of the different sizes of crane or dredge chain, and other information which buyers and users will find valuable for their files. Copies may be obtained, without charge, by addressing a request to **American Chain Company, Inc., Bridgeport, Connecticut,** mentioning **The Excavating Engineer.**

The Division of Highways of the State of California has just published their Sixth Biennial Report, constituting also the report of the California Highway Commission. This work is comprehensive in every detail and covers California highways from the personnel of the Division right down through construction and maintenance to the financial statement.

The Foote Bros. Gear & Machine Company of Chicago, Illinois, have recently issued a catalog on the Bates "Steel Mule" tractors. This 24-page book is excellently illustrated with diagrams and views of the Bates "Steel Mule." Copies may be obtained by writing to Foote Bros., 215 N. Curtis Street, Chicago, Illinois, asking for catalog B-100 and mentioning **The Excavating Engineer.**

FOR SALE

Space under this heading is available at the following rates, payable in advance of publication:

1 to 3 inches.....$4.30 an inch
4 to 7 inches..... 4.10 an inch
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An inch is measured vertically on one column — three columns to a page. Any space may be used measured by the even inch in height and by one, two or three columns in width.

The price per inch is based on total space used — multiply ad space by number of continuous insertions.

BUCYRUS 14-B STEAM SHOVEL, revolving type, ¾-yard. Serial number 1595, tractor type. Requires new boiler. For sale "as is" at a bargain. Located near New York City. Address Box 1207, % The Excavating Engineer, South Milwaukee, Wisconsin.

O. & S. 7-TON TYPE T MAGNET CRANE, gasoline power, caterpillar-type mounting. 35-foot boom, 39-inch Cutler-Hammer magnet. Also equipped to handle ¾-yard clamshell. Located southern Wisconsin. Can be inspected in operation. Priced very low. Address box 706, % The Excavating Engineer, South Milwaukee, Wisconsin.

1¼-YARD TRACTION TYPE MODEL 36 MARION SHOVEL No. 3737. Price $2500.
¾-YARD TRACTION TYPE ERIE SHOVEL No. 1397. Price $2000.
Address Box 314, % The Excavating Engineer, South Milwaukee, Wisconsin.

2-YARD MONIGHAN DRAGLINE. Located in levee district, Fairbanks Diesel motor. Price very low for quick sale. Address Box 705, % The Excavating Engineer, South Milwaukee, Wisconsin.

ERIE TYPE "B" STEAM SHOVEL — mounted on caterpillars. Shop number 1616. Good condition, ready for work. Address Box 700 % The Excavating Engineer, South Milwaukee, Wisconsin.

If You Do Not Find What You Want Listed — Write Us

The Excavating Engineer
South Milwuukee, Wis.

FOR SALE
OVERSTOCK OF MOTOR GENERATOR SETS

The following equipment has not been used and is available for sale only because it does not suit our machines as now being built:
1 MG SET, 90 horse power, 440 volts.
3 MG SET, 75 horse power, 440 volts.
2 MG SET, 75 horse power, 2200 volts.
1 MOTOR, 90 horse power, 500 volts.
Complete description on request.

BUCYRUS-ERIE COMPANY
Sales Department
South Milwaukee, Wis.

FOR SALE

"B" ERIE STEAM SHOVEL number 2642. Factory rebuilt. Caterpillar mounted, 19-foot 8-inch boom, 16-foot stick, ¾-yard dipper, power boom hoist, new boiler. Guaranteed. Price f. o. b. Erie, Pennsylvania, $7,500. Address Box 709, % The Excavating Engineer, South Milwaukee, Wisconsin.

EQUIPMENT
For Sale at Half Price

TWO TYLER HUMMER VIBRATOR SCREENS TYPE V-16, with single-deck frame complete.
ONE TYLER HUMMER VIBRATOR 17, with double-deck frame.
ONE 2 K. VA. ALTERNATING CURRENT ROTARY GENERAL ELECTRIC CONVERTER for operating the above equipment.

Central Indiana Coal Company
1016 Merchants Bank Bldg.
Indianapolis, Indiana

MARION STEAM SHOVEL—Model 92, Railroad Type, Serial No. 3775, equipped with 1¾-inch Chain, 5-Yard Dipper. This shovel is in A-1 condition, having new dipper sticks and roof completely overhauled in 1928. Any reasonable offer will be entertained, and, if offer accepted, would include in sale approximately $500 in essential repair parts now on hand. Subject to prior sale and inspection. Location near Kansas City. Address Box 105, % The Excavating Engineer, South Milwaukee, Wisconsin.

OSGOOD STEAM SHOVEL, shop No. 3102, mounted on caterpillars. $3500.00, priced for quick sale. Located near Rochester, New York. Address Box 713, % The Excavating Engineer, South Milwaukee, Wis.

FOR SALE
220-B BUCYRUS STEAM SHOVEL
Shop No. 2582

Excellent condition. Now located along railroad track. Ready to ship. Address
DAWSON DAYLIGHT COAL CO.
Dawson Springs, Kentucky.

BUCYRUS-ERIE CLASS-14 STEAM DRAGLINE with 60-foot boom and 2-yard Page bucket. Dragline is mounted on skids and rollers. Location North Texas. Address Box 1203, % The Excavating Engineer, South Milwaukee, Wisconsin.

ERIE TYPE "GA-2" FULL-REVOLVING GAS + AIR SHOVEL, shop number 3855, caterpillar mounted; 24-foot boom; 16-foot dipper handle; ⅞-yard manganese front inserted tooth dipper; power boom hoist; air self starter; trip rope idler, all necessary equipment complete.

ERIE TYPE "B" FULL-REVOLVING STEAM SHOVEL, shop number 2693, caterpillar-mounted; 19-foot 8-inch boom; 16-foot dipper handle; ⅞-yard manganese front inserted tooth dipper; power boom hoist; trip rope idler and all necessary equipment complete.

ERIE TYPE "B" FULL REVOLVING STEAM SHOVEL, shop number 1837, caterpillar mounting; 17-foot 6-inch boom; 14-foot dipper handle; ¾-yard new dipper.

OSGOOD No. 18 FULL REVOLVING STEAM SHOVEL, shop number 1203, mounted on new caterpillar type trucks; 19-foot boom; 13-foot dipper handle; ¾-yard dipper; complete; standard specifications.
All above f. o. b. cars, shipping point in Virginia. Address Box 319, % The Excavating Engineer, South Milwaukee, Wis.

MARION 37 STEAM SHOVEL, caterpillar mounted, 28-foot 6-inch boom, 19-foot handle, 1¾-yard manganese front dipper, located near Pittsburgh, Kansas. Machine used very little and in exceedingly good shape. Priced to sell.

MARION 26 STEAM SHOVEL, shop number about 2940. Equipped with 32-foot boom, 21-foot handle, mounted on 5-foot traction wheels. Can be inspected at Pittsburgh, Pennsylvania. Machine in excellent condition, ready for immediate delivery. Address Box 600, % The Excavating Engineer, South Milwaukee, Wisconsin.

BUCYRUS 30-B DIESEL SHOVEL, 25-foot boom and 14-foot handles, 1-yard dipper. Located in Indiana. Completely rebuilt. Carries same guarantee as new machine. Immediate shipment. Address Box 308, % The Excavating Engineer, South Milwaukee, Wisconsin.

TWO 20-B BUCYRUS DRAGLINES, numbers 4529 and 4530, equipped with 35-foot booms.
TWO 50-B BUCYRUS DRAGLINES, numbers 4877 and 4947, equipped with 50-foot booms.
All of these machines in fair condition and priced exceptionally attractive. Located in Northern California. Address Box 1003, % The Excavating Engineer, South Milwaukee, Wisconsin.

BUCYRUS 18-B STEAM SHOVEL, on traction wheels, Shop No. 1867, equipped with standard boom and bucket, also extra 40-foot boom and clamshell bucket, good serviceable condition, at Valparaiso, Ind.

BUCYRUS 70 STEAM SHOVEL, Shop No. 1189, good serviceable condition, at Valparaiso, Indiana.

BUCYRUS 70 STEAM SHOVEL, Shop No. 1149, good serviceable condition, at Valparaiso, Indiana.

MARSH-CAPRON CONCRETE MIXER, 14-S, good serviceable condition, at Valparaiso, Indiana.
Address Box 201, % The Excavating Engineer, South Milwaukee, Wisconsin.

FOR SALE
MODEL 208 P. & H. DRAGLINE (shop number about 1760), equipped with 45-foot boom, 1-yard drag bucket, including about $200 worth of repairs; located vicinity of Indianapolis. Priced to sell quick. Address Box 601, % The Excavating Engineer, South Milwaukee, Wisconsin.

AUSTIN No. 6 DRAGLINE, caterpillar mounted, 45-foot boom, 1¼-yard bucket, Fairbanks-Morse Type CC Semi-Diesel engine; shop number about 260. This machine is equipped with the Hansen Automatic Dragline Bucket. Located in vicinity of Milwaukee. In excellent condition and priced attractively. Address Box 200, % The Excavating Engineer, South Milwaukee, Wisconsin.

ERIE "B" COMBINATION SHOVEL AND CRANE, traction wheel mounted; ⅝-cubic-yard clam bucket, 40-foot boom. Shop number about 1050. Good condition; ready to work. Priced right. Located in southern Wisconsin. Address Box 700, % The Excavating Engineer, South Milwaukee, Wisconsin.

No. 70-C BUCYRUS STANDARD RAILROAD TYPE SHOVEL, shop number 1300, equipped with a 2½-yard dipper, f. o. b. railroad tracks, shipping point Virginia. Address Box 320, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE "B" ERIE STEAM SHOVEL, shop number about 2450, mounted on caterpillars, equipped with 19-foot 8-inch boom, 16-foot dipper handle, 1-cubic-yard dipper, and power boom hoist. Machine in A-1 condition. Located vicinity Rock Island, Illinois. Address Box 317, % The Excavating Engineer, South Milwaukee, Wis.

PORTABLE INGERSOLL-RAND GASOLINE-DRIVEN AIR COMPRESSOR, 90-cubic-foot capacity, complete with jackhammer, air hose, steel, etc. Ideal for paving and trenching. Reasonably priced. Address Box 318, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE L-75 THEW FULL CIRCLE SWING GASOLINE SHOVEL, Shop No. 3056, mounted upon a center drive truck, and equipped with 50-foot boom, double drums, and a 1½-yard Blaw-Knox bucket with teeth. Also boom hoist, dragline mechanism complete, and 3000 pounds counterweight. F. O. B. Lorain, Ohio. $13,825.00. Address Box 500, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE 3-A THEW, located near Pittsburgh, Kansas. 31-foot boom, 24-foot handle, 1-cubic-yard dipper, caterpillar mounted. Shop number about 2150. Shovel used very little and in very good condition. Equipped with new boiler. For immediate delivery. Address Box 806, % The Excavating Engineer, South Milwaukee, Wisconsin.

KOEHRING ¾-YARD GAS SHOVEL, 19-foot 6-inch boom, 16-foot dipper sticks. New fall 1926. Shop number about C400. Excellent condition. Located vicinity Milwaukee. Address Box 1226, % The Excavating Engineer, South Milwaukee, Wis.

KEYSTONE SKIMMER SCOOP STEAM SHOVEL, mounted on traction wheel, A-1 condition, purchased 1925. Located in Central Missouri. Address Box 302, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE "B" ERIE STEAM SHOVEL with power-operated boom hoist and brand new caterpillar-type mounting. Completely rebuilt, and will give service equivalent to that of a new machine. Ready for immediate shipment. Address Box 303, % The Excavating Engineer, South Milwaukee, Wisconsin.

GAS + AIR HIGH-LIFT ERIE SHOVEL, caterpillar-type mounting. Completely rebuilt. Ready for immediate shipment. Address Box 304, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE "A" ERIE STEAM SHOVEL, ⅝-yard dipper, 16-foot boom and 13-foot dipper handle. Caterpillar-type mounting. Completely rebuilt and with same guarantee as new machine. Immediate shipment. Located in Indiana. Address Box 305, % The Excavating Engineer, South Milwaukee, Wisconsin.

MARION MODEL 21 STEAM SHOVEL, Shop No. 5450, purchased new April, 1926, mounted on rigid crawlers, equipped with 20-foot boom, 15-foot dipper handle, one-cubic-yard dipper, power boom hoist. This shovel in excellent condition. Price $3000, F. O. B. Lansing, Michigan.

MARION MODEL 21 STEAM SHOVEL, Shop No. 5752, purchased new June, 1926, mounted on rigid crawlers, equipped with 20-foot boom, 15-foot dipper handle, one-cubic-yard dipper, power boom hoist. This shovel in excellent condition. Price $3000, F. O. B. Lansing, Michigan.

DRAGLINE EQUIPMENT for either of above machines, including 36-foot boom, front drum, fairleads, etc., but not including bucket. This dragline equipment is practically new. Price $1000.00.
Address Box 504, % The Excavating Engineer, South Milwaukee, Wisconsin.

BUCYRUS 50-B STEAM DRAGLINE; 50-foot boom; shop number about 4250; excellent condition; location Detroit district. Address Box 312, % The Excavating Engineer, South Milwaukee, Wisconsin.

BUCYRUS 80-B STEAM SHOVEL on caterpillar mounting, 48-foot boom, 30-foot sticks, 2-yard bucket, steam trip, new lighting plant, Low price for quick sale.

BUCYRUS 55-B STEAM SHOVEL on caterpillar mounting.
The above machines are located in Kansas. Address Box 300, % The Excavating Engineer, South Milwaukee, Wisconsin.

4-CUBIC-YARD WARD-LEONARD ELECTRIC RAILWAY TYPE SHOVEL on caterpillar type mounting and only six years old. Address Box 403, % The Excavating Engineer, South Milwaukee, Wisconsin.

BUCYRUS 31-B STEAM SHOVEL, caterpillar mounted, equipped with 20-foot 6-inch boom, 15-foot dipper handle, 1-cubic-yard dipper, boom hoist, and special propelling gear guard; shop number about 3920; located vicinity Rock Island, Illinois; priced to sell. Address Box 1104, % The Excavating Engineer, South Milwaukee, Wisconsin.

OSGOOD MODEL 18 STEAM SHOVEL on traction wheels, equipped with ¾-yard dipper. Shop number about 815. Reported in good condition. Located vicinity St. Louis. Priced low. Address Box 1218, % The Excavating Engineer, South Milwaukee, Wisconsin.

TYPE "A" SHOVEL, shop number about 700, equipped with 16-foot boom, 12-foot 6-inch dipper handle, ½-cubic-yard dipper and 26-foot clamshell boom. In good condition. Located in Arkansas. Bargain. Address Box 501, % The Excavating Engineer, South Milwaukee, Wisconsin.